



SM50855



PURMANN (Matthaeus Gottfried, 1649-1711) was a surgeon in the Brandenburg army. He performed most of the operations then known, including the suturing of wounded intestines, of which he says, "if the intestine does not protrude, draw it toward you for the purpose of sewing, which must not be neglected, and should be done either with silk after the manner of glovers who sew their skins thus, or with a fine catgut made from intestines of a lamb, soaked overnight in wine".

## D&G Sutures

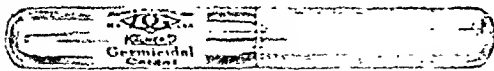
"THIS ONE THING WE DO"

DAVIS & GECK INC.



## Kalmerid Catgut

**GERMICIDAL.** Exerts a bactericidal action in the suture tract. Supersedes the older unstable iodized sutures. Impregnated with the double iodine compound, potassium-mercuric-iodide.† Heat sterilized.



The boilable grade is unusually flexible for boilable catgut; the non-boilable grade is extremely flexible.

### TWO VARIETIES

BOILABLE*		NON-BOILABLE
NO.		NO.
1205.....	PLAIN CATGUT.....	1405
1225.....	10-DAY CHROMIC.....	1425
1245.....	20-DAY CHROMIC.....	1445
1285.....	40-DAY CHROMIC.....	1485

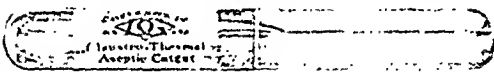
Sizes: 000..00..0..1..2..3..4

*Approximately 60 inches in each tube*

Package of 12 tubes of a size.....\$3.00  
Less 20% on gross or more or \$28.80, net, a gross

## Claustro-Thermal Catgut

**ASEPTIC**—not germicidal. Sterilized by heat after the tubes are sealed. Boilable.\* Unusually flexible for boilable catgut.



NO.	
105.....	PLAIN CATGUT
125.....	10-DAY CHROMIC CATGUT
145.....	20-DAY CHROMIC CATGUT
185.....	40-DAY CHROMIC CATGUT

Sizes: 000..00..0..1..2..3..4

*Approximately 60 inches in each tube*

Package of 12 tubes of a size.....\$3.00  
Less 20% on gross or more or \$28.80, net, a gross



D&G Sutures are always found neutral under the most delicate titration tests. This is one of the reasons they uniformly behave well in the tissues.

## Atraumatic Needles

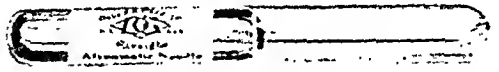
**FOR GASTRO-INTESTINAL** suturing and for all membranes where minimized suture trauma is desirable. Integrally affixed to 20-day Kalmerid catgut. Boilable.\*

Experimental evidence has proven 20-day chromic catgut the most suitable for gastro-intestinal suturing. It has been found that gastric wounds are fully healed within 12 days, and intestinal wounds at 16 days. At these periods the 20-day catgut (regardless of size) still retains, respectively, 60 per cent and 30 per cent of its initial strength.

THEY DO NOT BEND HERE



ILLUSTRATIONS ARE FIFTY EIGHTH SIZE



STRAIGHT NEEDLES ARE IN ROUND TUBES



CURVED NEEDLES ARE IN FLAT TUBES

NO.		INCHES IN TUBE	DOZEN
1341..	STRAIGHT NEEDLE.....	28.....	\$3.00
1342..	TWO STRAIGHT NEEDLES...36.....		3.60
1343..	3/8-CIRCLE NEEDLE.....	28.....	3.60
1345..	1/2-CIRCLE NEEDLE.....	28.....	3.60

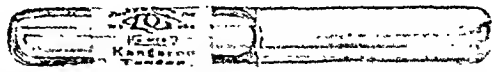
Less 20% discount on one gross or more

Sizes: 0 and 1

Packages of 12 tubes of one kind and size

## Kangaroo Tendons

**GERMICIDAL**, being impregnated with potassium-mercuric-iodide.† Chromicized to resist absorption in fascia or in tendon for approximately thirty days. The non-boilable grade is extremely flexible.



NO.	
370.....	NON-BOILABLE GRADE
380.....	*BOILABLE GRADE

Sizes: 0..2..4..6..8..16..24

Each tube contains one tendon

Lengths vary from 12 to 20 inches

Package of 12 tubes of a size.....\$3.00  
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D&G Sutures are obtainable from responsible dealers everywhere; or direct, postpaid

## Non-Absorbable Sutures

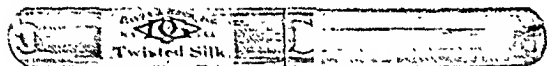


NO.	INCHES IN TUBE	SIZES
350..CELLULOID-LINEN.....	60.....	000, 00, 0
360..HORSEHAIR.....	168.....	00
390..WHITE SILKWORM GUT..	84.....	00, 0, 1
400..BLACK SILKWORM GUT..	84.....	00, 0, 1
450..WHITE TWISTED SILK...	60.....	000 TO 3
460..BLACK TWISTED SILK....	60.....	000, 0, 2
480..WHITE BRAIDED SILK....	60.....	00, 0, 2, 4
490..BLACK BRAIDED SILK....	60.....	00, 1, 4

### BOILABLE

Package of 12 tubes of a size. . . . \$3.00  
Less 20% on gross or more or \$28.80, net, a gross

## Short Sutures for Minor Surgery



NO.	INCHES IN TUBE	SIZES
802..PLAIN KALMERID CATGUT..	20..00, 0, 1, 2, 3	
812..10-DAY KALMERID "	20..00, 0, 1, 2, 3	
822..20-DAY KALMERID "	20..00, 0, 1, 2, 3	
862..HORSEHAIR.....	56.....	00
872..WHITE SILKWORM GUT...	28.....	0
882..WHITE TWISTED SILK.....	20.....	000, 0, 2
892..UMILICAL TAPE.....	24...1/8-IN. WIDE	

### BOILABLE

Package of 12 tubes of a size. . . . \$1.50  
Less 20% on gross or more or \$14.40, net, a gross

## Emergency Sutures with Needles

UNIVERSAL NEEDLE FOR SKIN, MUSCLE, OR TENDON



NO.	INCHES IN TUBE	SIZES
904..PLAIN KALMERID CATGUT..	20..00, 0, 1, 2, 3	
914..10-DAY KALMERID "	20..00, 0, 1, 2, 3	
924..20-DAY KALMERID "	20..00, 0, 1, 2, 3	
964..HORSEHAIR.....	56.....	00
974..WHITE SILKWORM GUT...	28.....	0
984..WHITE TWISTED SILK.....	20.....	000, 0, 2

### BOILABLE

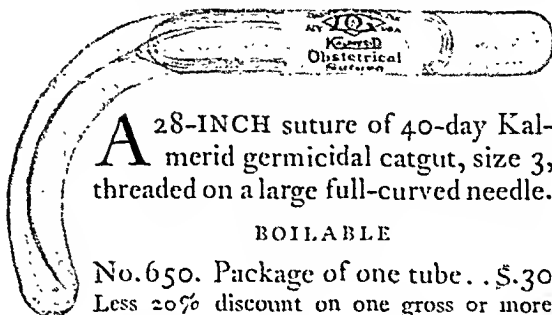
Package of 12 tubes of a size. . . . \$2.40  
Less 20% on gross or more or \$23.04, net, a gross

The ash of D & G Sutures is assayed to make sure that no traces remain of uncombined chromium nor of other residues of the chromicizing process.



## Obstetrical Sutures

FOR IMMEDIATE REPAIR OF PERINEAL LACERATIONS

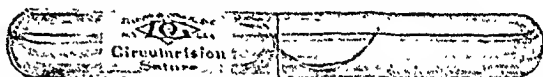


A 28-INCH suture of 40-day Kalmerid germicidal catgut, size 3, threaded on a large full-curved needle.

### BOILABLE

No. 650. Package of one tube. . \$3.00  
Less 20% discount on one gross or more

## Circumcision Sutures



A 28-INCH suture of Kalmerid germicidal catgut, plain, size 00, threaded on a small full-curved needle.

### BOILABLE

No. 600. Package of 12 tubes. . . . \$3.00  
Less 20% on gross or more or \$28.80, net, a gross

## Universal Suture Sizes

All sutures are gauged by the standard catgut sizes as here shown

000	_____	4	_____
00	_____	6	_____
0	_____	8	_____
1	_____	16	_____
2	_____	24	_____
3	_____		

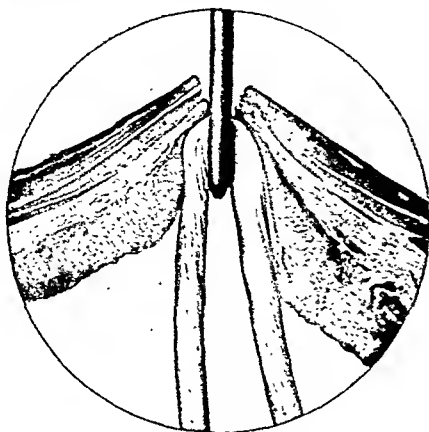
\*These tubes not only may be boiled but even may be autoclaved up to 30 pounds pressure, any number of times, without impairment of the sutures.

†Potassium-mercuric-iodide is the ideal bactericide for the preparation of germicidal sutures. It has a phenol coefficient of at least 1100; it is not precipitated by serum or other proteins; it is chemically stable—unlike iodine it does not break down under light and heat; it interferes in no way with the absorption of the sutures, and in the proportions used is free from irritating action on tissues.

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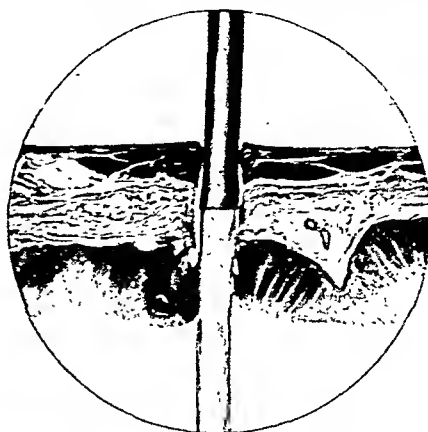
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# MINIMIZED SUTURE TRAUMA



ORDINARY NEEDLE

Photomicrograph of ordinary intestinal needle penetrating the stomach wall. Note excessive trauma produced by the doubled catgut.



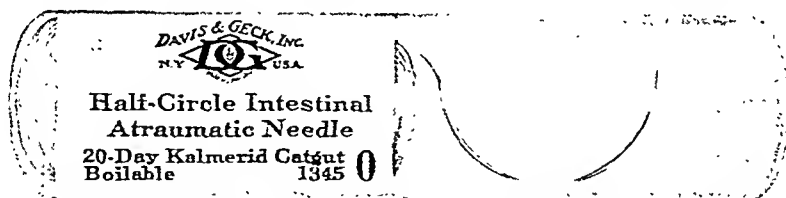
ATRAUMATIC NEEDLE

Photomicrograph prepared under identical conditions, of the D&G Atraumatic Needle with suture attached. Note minimized trauma.

## D&G ATRAUMATIC NEEDLE

Affixed to the Boilable Grade of  
20-Day Kalmerid Germicidal Catgut

FOR GASTRO-INTESTINAL AND MEMBRANE SUTURING



PRODUCT  
No.

IN PACKAGES OF TWELVE TUBES OF ONE KIND AND SIZE

DOZEN  
TUBES

- |  |        |
|--|--------|
| 1341. A straight intestinal needle affixed to a 28-inch suture.....              | \$3.00 |
| 1342. Two straight intestinal needles affixed to a 36-inch suture.....           | 3.60   |
| 1343. A $\frac{3}{8}$ -circle intestinal needle affixed to a 28-inch suture..... | 3.60   |
| 1345. A half-circle intestinal needle affixed to a 28-inch suture.....           | 3.60   |

SIZES: 0 AND 1

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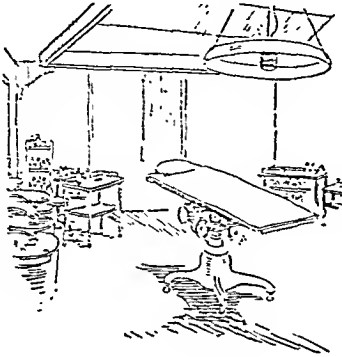
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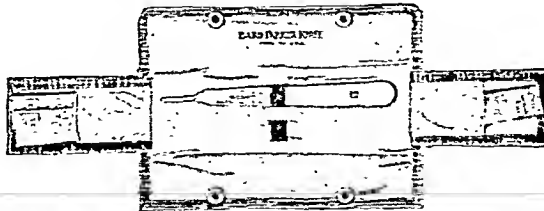
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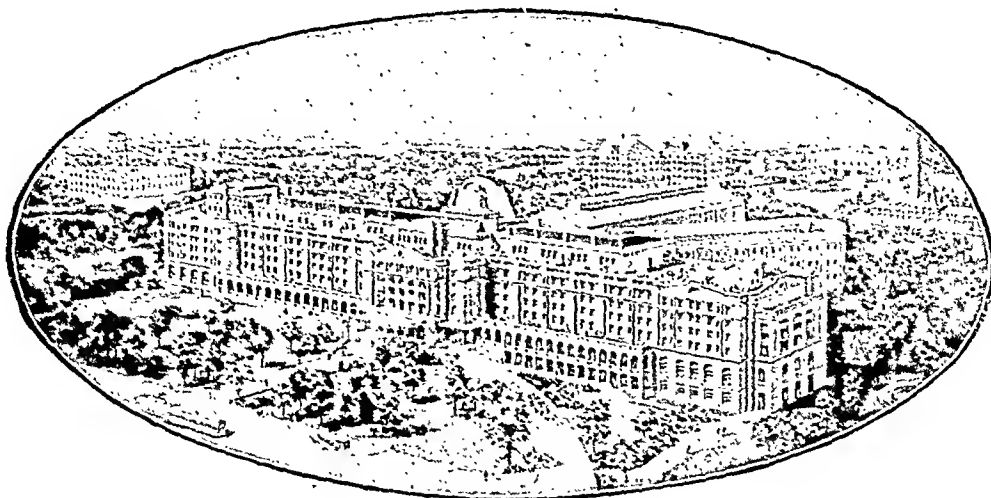
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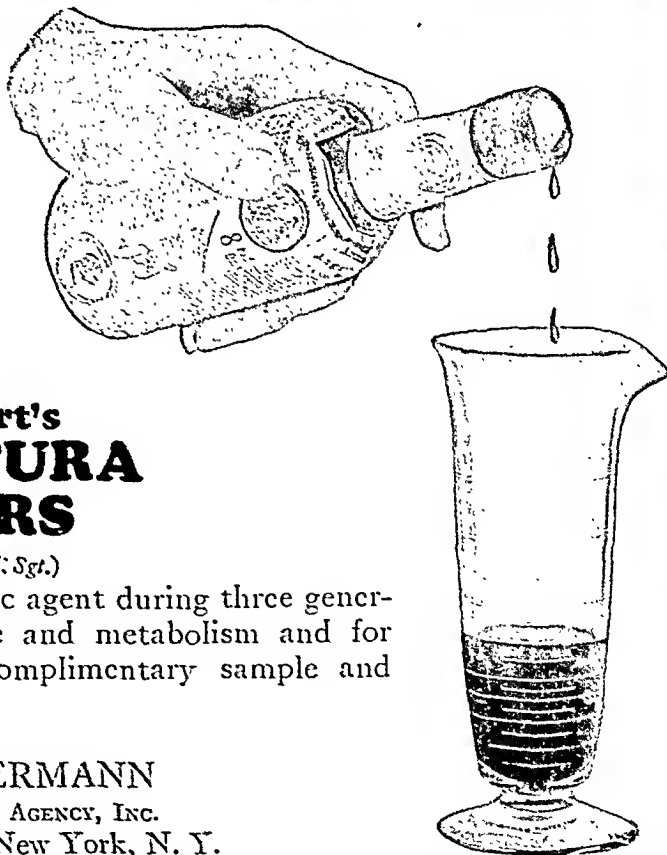
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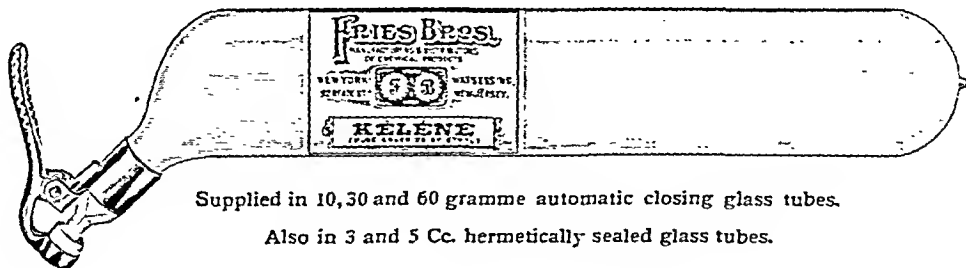
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CHIZZOLA, GIULIANO. Foreign bodies in the duodenum. *Arch. di radiol.*, Mar.-June, 1926, ii, 136-152.

Foreign bodies seem to be arrested less frequently in the duodenum than in any other part of the intestine. There were 35 cases described in the literature up to 1923; the author has found 4 in the literature since that time and describes 2 of his own, making a total of 41.

His first case was in an insane woman of twenty-five who was suicidal. She swallowed a coffee-spoon 14 cm. long on the 24th of January, 1924 and he was called to make a roentgen examination on May 5. This showed the spoon lying obliquely in the duodenum from above downward and from right to left, with the large end at the duodenojejunal angle, distending the second and third parts of the duodenum. It had probably passed promptly through the stomach and lain in the duodenum for the most of the three months and ten days since it was swallowed. The patient had no symptoms at all. On gentle manipulation it passed into the jejunum and then progressed normally through the intestine until it reached the splenic flexure of the colon where it was arrested and could not pass the angle which was abnormally acute in this case. As all efforts

to make it pass failed for thirty-three days the abdomen was opened up and the spoon located; the colon was not opened but the spoon was made to pass the angle by manipulation and after it had reached the rectum was extracted through the anus.

The second case was in a girl aged fifteen who swallowed a pin 3 cm. long. In this case there was pain and the roentgen examination was made three days later. It showed the pin lying at the angle between the second and third portions of the duodenum. As manipulation was painful in this case the site of the pin was marked on the skin and the abdomen opened. When the pin was located the surgeon manipulated it so that the point perforated the duodenal wall and extracted it in that way. The slight perforation was sutured with Lembert sutures. There were signs of mild local peritonitis around the pin.

Long objects are apt to be arrested in the duodenum because of the shape and fixity of the organ and also because of its normal to-and-fro movement which is accentuated by the irritation due to the presence of a foreign body. In localizing these foreign bodies the author made use of an Einhorn's sound enclosed in opaque rubber which showed the whole course of the duodenum.

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## THE OPERATIVE TREATMENT OF HERNIA BY LIVING SUTURES\*

BRADLEY L. COLEY, M.D., AND EDGAR BURKE, M.D.

NEW YORK CITY

IN discussing the later methods of repair of hernia, it seems appropriate to review at some length the history of operative treatment of this condition, to trace the course of surgical procedure, and to show wherein its limitations have ever served to stimulate the adoption of varying methods of attack.

Since the advent of modern surgical treatment, Macewen was one of the first to advocate free exposure of the sac and adjacent structures of the inguinal canal. He excised a portion of the sac and, folding the remainder into a boss or tampon, sutured it inside the internal ring. Marcy and Lucas-Championnière ligated and excised the sac near the internal ring. Ball opened the sac, freed it of adherent omentum, ligated and twisted it. Earlier operators did not remove the sac. Czerny opened the sac at the internal ring, and closed it with a purse-string suture. Socin used a purse-string suture at the neck, divided the sac transversely below this point, and left the lower portion undisturbed, pushing the upper portion of it up inside the internal ring. It is interesting to note that the older surgeons believed that a wound that healed by suppuration had a stronger cicatrix, and McBurney packed the wound with gauze to prevent its healing too rapidly.

Thus far, the methods in use involved no attempt to reconstruct the inguinal

canal. Marcy, in 1881, was the first to recommend high ligation of the sac, transplantation of the cord, and reconstruction of the inguinal canal as done at the present time. His other noteworthy contributions were the use, for the first time, of kangaroo tendon sutures, and closure of the wound without drainage. Bassini a few years later described the method that still bears his name and has become a standard procedure for the repair of inguinal hernia the world over. The chief points in his operation are: high dissection and ligation of the sac, cord transplantation, and restoration of the posterior canal wall by approximation of the internal oblique and transversalis muscles and their conjoined tendon to Poupart's ligament. Believing that the Bassini method modified so as to leave the cord undisturbed might be an improvement, Bull and Coley (William B.) in 1892 described an operation with suture of the internal oblique and transversalis muscles to Poupart's ligament over the cord. Ferguson's operation, devised and published in 1899, is similar in all important respects. However, in a parallel series of cases at the Hospital for the Ruptured and Crippled, Bull and Coley found the percentage of recurrence considerably greater than where cord transplantation was done, so they abandoned the routine use of the method.

As larger series of carefully followed

\* Results from the Second Surgical (Cornell) Division, Bellevue Hospital.



hernia cases operated upon by the Bassini method began to be accumulated, it soon became apparent that, especially in obese or poorly developed subjects, or where the hernia was of the direct variety, the recurrence rate was decidedly high. As a result, a number of modifications were devised to further fortify the inguinal canal wall posteriorly. Among the most prominent of these was the rectus transplantation, advocated by Wölfler as early as 1892. He incised the anterior rectus sheath, drew the muscle down, and sutured it to Poupart's ligament. Bloodgood sutured both the rectus muscle and its sheath, together with the conjoined tendon and internal oblique, to Poupart's ligament. Halsted, Hotchkiss, Lusk, and Berger secured a triangular flap from the anterior rectus sheath and sutured it to Poupart's ligament. Of all the varieties of rectus transplantation, the method of Downes has been most widely used and is, we believe, the best.

Belief that further reinforcement could best be obtained by using the external oblique aponeurosis as one of the layers of the repair was the view of Lucas-Championnière and, as practiced by Andrews (1895), it is an excellent method. It consists in overlapping, or imbricating the external oblique aponeurosis as an additional supporting layer after the deep sutures have been placed. As described by Andrews, the median edge of the external oblique aponeurosis is sutured to Poupart's ligament and the cord is placed on its new bed. The lateral edge is then lapped over the cord and sutured by a running stitch to the surface of the upper flap.

Schley and Stetten simultaneously described similar modifications of this method which have seemed to us to be an improvement of real value. They overlap the lateral leaf of the external oblique beneath the cord instead of over it. Thus, the cord lies beneath the skin and subcutaneous fat instead of between two firm and relatively unyielding fascial layers; moreover, the strength of the repair is

enhanced by one more layer of fascia. Of the two, this last consideration has seemed to us the more important. We feel that this type of repair is preferable to transposition of the rectus muscle for two reasons: first, it is anatomically sound; and second, it makes use of a broad apposition of fascial planes without tension. In theory, diverting a portion of rectus muscle to an oblique position from its normal vertical one, has always seemed to us anatomically unsound, and the results obtained have not warranted its adoption on empirical grounds.

#### USE OF FASCIA LATA IN HERNIA OPERATIONS

Kirshner used a free patch transplant of living fascia lata taken from the thigh to reinforce the repair, tacking it over the line of suture of the external oblique aponeurosis. He stated that it had the following advantages: its accessibility, abundance, strength, inelasticity, and readiness to heal in when transplanted.

McArthur, in 1904, utilized a strip of external oblique aponeurosis cut parallel to the customary incision made in it in the operation for inguinal hernia, but leaving it attached at its lower extremity, to suture the conjoined tendon to Poupart's ligament. This operation may be considered as a forerunner of the Gallie-Le Mesurier operation. It has the advantage of avoiding the operation upon the thigh, and is practically as simple as the ordinary Bassini method. It is of use in small direct hernias and in those of indirect type where the muscle is lacking in amount or in quality. The amount of suture material available from this source is limited and its quality is distinctly inferior to the fascia lata taken from the thigh. In large direct hernias, we feel that the use of McArthur's living-suture method will not offer as much additional strength as a Gallie-Le Mesurier operation.

Gallie and Le Mesurier found as a result of considerable animal experimentation, that patch transplants gave way at the

site of attachment to the edges of the defects and showed a tendency to balloon out in consequence. They devised a most ingenious method of repair using strips of living fascia lata from the thigh as sutures, and weaving them across the defective inguinal canal, thus creating a new wall of living tissue which was anchored securely to Poupart's ligament laterally, and to the conjoined tendon and muscle mass of internal oblique and transversalis internally. It is this operation which we have adopted for difficult closures of large indirect and direct hernias and especially for recurrent hernias, and ventral and umbilical hernias. The technique described by us is in the main their operation.

The operation, as performed by us, requires three surgeons and two nurses. There have been occasions when we have contented ourselves with the services of but a single nurse, an arrangement which does well enough where all the persons concerned are accustomed to operating together on this type of case; but the presence of an additional nurse greatly facilitates matters and insures smoother and quicker work.

The illustration will suffice to make clear the mode of draping the patient which experience has taught us to be the simplest and best. The painting of the skin of abdomen and leg with iodine is done before a single sterile cloth is adjusted, an assistant seizing the foot and holding the leg well up while the iodine is applied in a continuous coating extending from the abdomen well down upon the calf and including the posterior as well as the anterior surface of the limb.

The fascia strips should be taken from the thigh opposite the side on which the hernia is situated in order that the surgeon preparing the sutures may interfere as little as possible with the chief operator. If a bilateral hernia is to be repaired at one sitting, the operator should begin on the side opposite that from which his assistant is procuring the suture material. In reality, two separate and distinct

operative procedures are being simultaneously performed upon the patient, and separate instrument tables must be arranged. The surgeon working upon the thigh should sit on a small stool, as this will bring the part to a convenient level, and keep him out of the way of the two men engaged in the actual hernia repair. We begin on the hernia and on the leg at the same moment, finding that by the time the assistant has prepared the living sutures and closed the wound in the thigh, the operator is generally ready to begin the actual repair of the inguinal canal. In this way an extra assistant is at the disposal of the surgeon at the time when he is most needed.

When we first began using the Gallie method, we were in the habit of simply exposing the fascia lata of the thigh by an appropriate incision and removing the strips as called for by the operator; but we have since abandoned this practice because of the delay which it involves, and because it deprives the operator of the assistance of the second surgeon, who, when using this technique, is kept continually busy up to and beyond the finishing of the main operation. As soon as the necessary number of fascial strips have been fastened in the Gallie needles, they are wrapped in a piece of sterile gauze moistened with warm physiological salt solution and laid aside until needed. We have found that placing them in a bowl of saline solution is inadvisable, as the fascia becomes soft, waterlogged, and prone to tear if left in the solution for more than a few minutes. If left in moist gauze, they keep in far better condition, and we have never found any disadvantage connected with this practice. It is well to rotate inward the leg from which the sutures are to be taken, and to maintain it in this position by placing a sand bag across the foot. A far better access to the outer surface of the thigh is obtained by so doing. The question whether it is worth while attempting to close the defect left in the fascia lata of the thigh after the suture strips have been

removed, has often arisen. Various surgeons whom we have interviewed regarding this point have been of different opinions. We ourselves do not favor its closure. There is often a considerable degree of tension. We have recently had to perform a second living-suture operation upon the same individual, and in this case, we exposed the thigh at the site of the previously removed sutures; we found that the defect in the fascia had been completely obliterated, with the formation of a new and equally strong aponeurotic layer from which we were able to take our sutures for the second operation. The skin incision over the external aspect of the thigh is closed by interrupted silkworm gut sutures. A number of our patients have complained of a feeling of tenseness in the leg during the first day or two after leaving their beds, but this has always disappeared within a very short time.

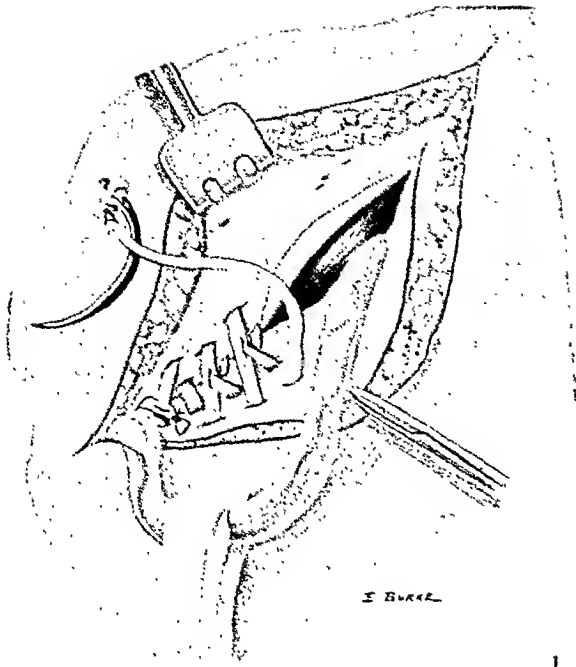
As both of us favor an overlapping type of operation for all direct inguinal hernias, we have adapted the Gallie technique to this mode of repair, and the great majority of the cases in the series herewith presented have been so dealt with. The accompanying illustrations will make the technique clearer than a verbal description could possibly do. We have found, particularly in those cases where the hernia was unilateral, that there is often surprisingly little tension, especially in somewhat emaciated individuals with relaxed abdominal walls, so that the "sock darning" use of living sutures may be unnecessary. In these cases, we have approximated the conjoined tendon and the fibers of the internal oblique to Poupart's ligament with the continuous living suture precisely as if doing the ordinary type of overlapping repair, the operation differing from this last only in so far that strips of fascia lata were used as a running suture in place of the usual interrupted sutures of chromic catgut or kangaroo tendon (Fig. 1). In those cases in which there appears to be marked tension when the conjoined tendon and the internal oblique muscle

are brought into contact with Poupart's ligament, we adopt the "sock darning" type of repair, using as many as three strips of fascia for this purpose. A second row of deep sutures is superimposed upon the first row, traversing the conjoined tendon and internal oblique and transversalis muscles more medially and Poupart's ligament more laterally than the first row. This second row serves to secure a very firm anchorage internally and prevents there being any tension on the first row of sutures (Fig. 2). In cases that are many times recurrent, with little or no conjoined tendon and internal oblique muscle, the innermost attachment of this second layer may include the edge of the rectus, without any effort, however, to draw this structure upwards to Poupart's ligament, but using it solely as an anchorage for the sutures which, themselves, bridge the gap.

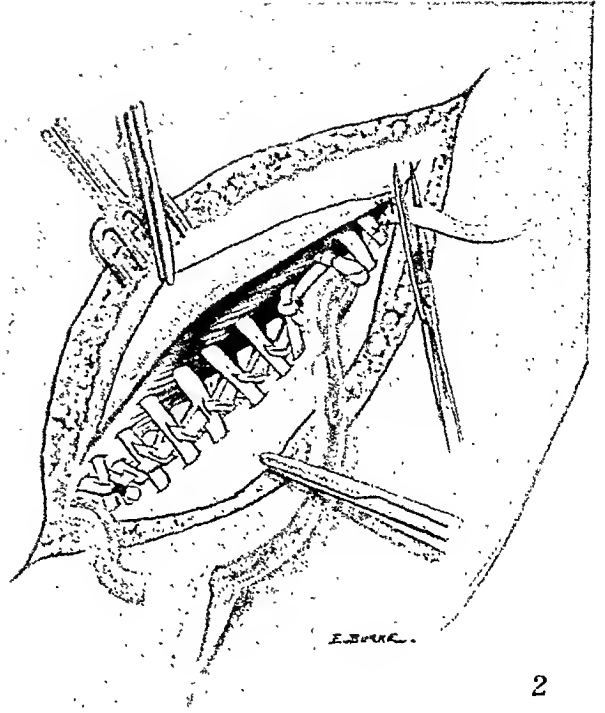
The deep layer of sutures having been completed, we approximate the medial leaf of the external oblique to Poupart's ligament (Fig. 3), and then overlap the lateral leaf suturing it to the superficial surface of the medial leaf (imbrication of the external oblique beneath the cord); thus, at the completion of the operation, the cord lies subcutaneously (Fig. 4). If there is an insufficient amount of aponeurosis to permit of this overlapping, we content ourselves with suturing the edges of the external oblique beneath the cord without overlapping.

Of course, it is by no means essential to follow the pattern of interweaving here illustrated (Fig. 2); any other that bridges the defect thoroughly and is so locked as to prevent sliding of the suture upon itself will do equally as well.

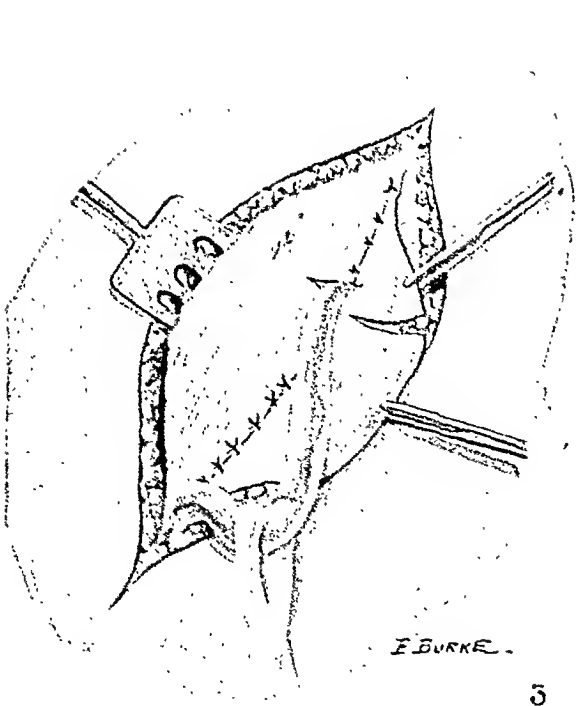
*Postoperative Course.* The dressings are applied separately to the hernia and thigh wounds and are so fastened as to permit of inspection of the one without exposure of the other. Sterile gauze leg rolls are used to swathe the thigh incision and the use of a spica bandage is advocated to support the inguinal dressings firmly



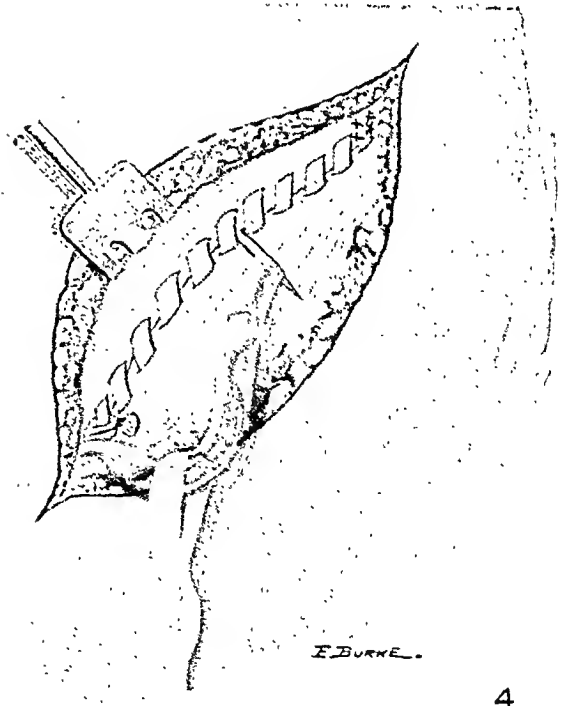
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2



3



4

FIG. 1. Beginning of first layer of living suture. Note: This figure represents the medial leaf of the external oblique included in the suture line, which we do not generally practice. (See Fig. 2.)

FIG. 2. Completion of first and second layers of living suture. Note the method by which point where the cord emerges at the internal ring is protected by circumferential living suture.

FIG. 3. Medial leaf of external oblique aponeurosis stitched to Poupart's ligament with interrupted chronicized catgut sutures.

FIG. 4. Completion of overlapping by suture of edge of lateral leaf of external oblique aponeurosis to surface of medial leaf. Note: This step is depicted as with the use of living sutures. As a rule, chronicized catgut is used for this layer; or the external oblique is simply closed beneath the cord with a living suture, no attempt being made to overlap.

"The Operative Treatment of Hernia by Living Sutures" by Bradley L. Coley and Edgar Burke.

THE AMERICAN JOURNAL OF SURGERY,  
N. S. Vol. ii, Jan., 1927.



and to maintain even pressure on the incision; this tends to prevent the accumu-

We feel that eighteen to twenty-one days in bed should be the rule for cases



FIG. 5. Double direct inguinal hernia, illustrative of type for which living suture repair is indicated.

lation of blood and serum in the subcutaneous space. All cases are placed in the



FIG. 6. Scrotal hernia of the type in which obliquity of the inguinal canal is largely lost and in which recurrence by the simpler methods of operation is likely to occur.

operated upon by the living suture method.

The course after operation has been on the whole no less satisfactory than in similar series of herniotomies by the more

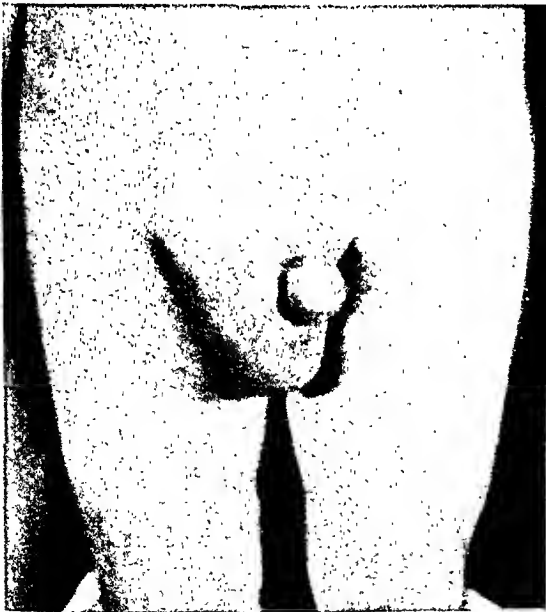


FIG. 7. Recurrent indirect inguinal hernia (scrotal), a type well suited to the living suture operation.

Gatch position with knees elevated and shoulders raised to take tension off the repair.

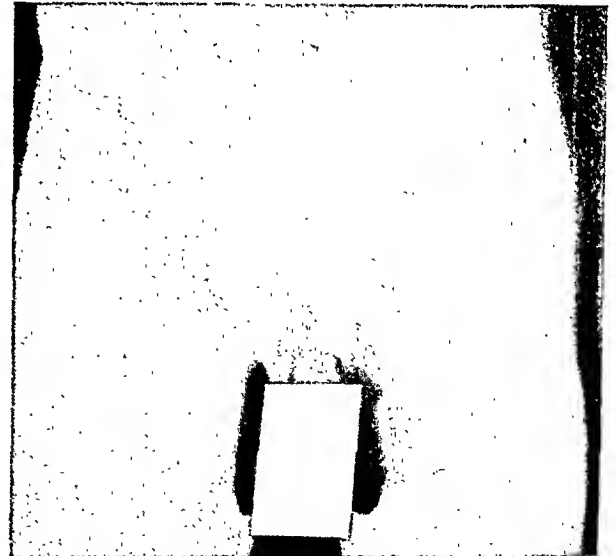


FIG. 8. Recurrent indirect inguinal hernia. Recurrence in this case had apparently followed the overlapping type of operation and took place at the internal ring.

simple methods of repair. The longer duration of the operation has not resulted in an increase in pulmonary complications. Postoperative tympanites has occasion-

No.	Sex	Age	Type of Hernia	Date of Operation	Infection	Other Complications	Period Followed	Result
1	M	28	RIIH-Rec.	5/ 6/25	Thigh wd.	None	19 months	Recurrence
2	M	49	LIIH-Rec.	7/ 9/25	.....	.....	8 months	Firm repair
3	M	58	DDIH-Rec.	6/ 3/25	Sup. left side	.....	15 months	Firm repair both sides
4	M	35	LIIH (Scrotal)	6/17/25	.....	Phlebitis rt. leg	6 months	Firm repair
5	M	51	LDIH-RIIH	5/ 1/25	.....	.....	7 months	Firm repair both sides
6	M	48	DIIH-Rec.	12/12/24 L. 1/26/25 R.	.....	.....	11 months	Firm repair both sides
7	M	52	LDIH	1/10/25	Deep	.....	2 months	Firm repair
8	M	48	DDIH	10/27/24	Sup. rt. side	.....	1 month	Firm repair
9	M	23	LDIH-Rec.	5/24/24	.....	.....	7 months	Firm repair
10	M	58	RDIH-Rec.	6/ 2/24	.....	.....	0	?
11	M	32	RDIH	10/25/24	.....	.....	0	?
12	M	47	RDIH	10/25/24	.....	.....	3 months	Firm repair
13	M	28	VH	6/ 6/25	.....	.....	0	?
14	M	51	DDIH	6/18/25	.....	Peripheral neuritis rt. hand	17 months	Firm repair
15	M	42	VH	4/ 8/25	Deep—Sutures sloughed	.....	0	Recurrence
16	M	38	DDIH-Rec.	5/13/25	.....	.....	0	?
17	M	39	VH	1/26/25	Deep with slough part of suture	Wd. healed in 43 days	21 months	Firm repair
18	M	34	RIIH	8/21/25	.....	.....	7 months	Firm repair
19	M	52	LDIH-Rec.	7/23/24	Deep with slough part of suture	.....	0	?
20	M	68	LDIH-Rec.	1/23/25	Deep slough of some of sutures	.....	18 months	Diffuse bulge classified as recurrence
21	M	27	DDIH-UH	1/ 3/25	.....	.....	4 months	Firm repair all three hernias
22	M	55	RDIH	7/30/25	.....	.....	10 months	Firm repair
23	F	55	UH	5/ 9/24	.....	.....	0	?
24	M	57	RDIH	2/12/25	.....	.....	13 months	Firm repair
25	M	37	DDIH	6/13/25	.....	.....	0	?
26	M	33	RJIH-Rec.	11/14/25	.....	.....	11 months	Recurrence
27	M	57	LIIH	12/ 9/25	Wd. infected	.....	0	?
28	M	42	DDIH	1/ 1/26	.....	.....	0	?
29	M	39	RJIH-Rec.	2/10/26	.....	.....	2 months	Firm repair
30	M	68	RIIH-Rec. Scrotal	7/ 2/26	Deep with sloughing sutures	Prostatic obstruction, chronic bronchitis	3 months	Recurrence
31	M	31	VH	6/ 8/26	Infected hematoma	.....	3 months	Firm repair
32	M	59	DIIH	5/16/26	.....	.....	5 months	Firm repair on left Right: recurrence
33	F	56	VH	6/14/26	Infected hematoma	Vomiting and fever	2 weeks	Firm repair
34	M	54	RJIH-Rec.	5/18/26	.....	.....	4 months	Firm repair
35	F	53	VH	6/21/26	Deep but low grade noted on 19th day	.....	2 months	Firm repair. Slight serous discharge from sinus
36	M	32	LIIH-Rec.	6/23/26	Small hematoma	.....	0	?
37	M	56	RIIH-Scrotal	7/17/26	.....	Lobar pneumonia	.....	Died 7th day post-operative
38	M	45	LIIH-Rec.	6/26/26	Superficial	.....	4 months	Firm repair
39	M	31	RDIH-Rec. Inearecrated	8/12/26	.....	.....	0	?
40	M	28	RIIH-Rec.	8/19/26	.....	.....	2 months	Firm repair
41	M	26	RIIH	8/19/26	.....	.....	2 months	Firm repair
42	M	48	RIIH	9/ 6/24	.....	.....	18 months	Firm repair

No.	Sex	Age	Type of Hernia	Date of Operation	Infection	Other Complications	Period Followed	Result
43	M	58	UH	2/ 3/25	.....	.....	0	?
44	M	50	RIIH	3/11/25	.....	.....	0	?
45	M	46	LIIH-Rec. RIIH	8/24/25	.....	.....	14 months	Firm repair both sides
46	F	43	VH	11/13/25	.....	.....	0	?
47	M	36	LDIH-Rec. RDIH	1/11/26	.....	.....	0	?
48	M	28	LDIH-Rec.	3/31/26	.....	.....	6 months	Firm repair
49	F	55	LIIH	6/ 1/25	.....	.....	16 months	Firm repair
50	M	52	LDIH-Rec.	5/16/25	.....	.....	16 months	Firm repair

ally been troublesome, but has yielded to the prompt use of the customary measures taken to combat it. Wound infection has been a complication in fourteen cases, ranging in severity from stitch abscess to complete infection of the deeper layers of the repair. We feel that this is a most important cause of failure to effect a cure. In some cases the sutures sloughed out in part and were discharged from the wound. It should be stated that these patients were operated upon in an operating room used daily for every form of general and genitourinary surgery with a liberal percentage of virulent pus cases. It is our belief that the percentage of clean cases of various sorts that develop wound infection is higher than obtains in operating rooms that are used exclusively for non-infected surgical cases. However, it is also our belief that the Gallie procedure is more apt to be followed by wound infection than the simpler hernioplasties, and that the presence of free fascial grafts is one of the factors in the increased liability to infection. The more frequent occurrence of hematoma is undoubtedly another important factor in the series of cases under consideration. There were fourteen infections of the hernia wound, or 22.4 per cent. In a series of 500 simple consecutive herniotomies performed on the Second Surgical Division of Bellevue Hospital, whose records were studied for comparison, there were 64 infections (12.8 per cent) of all degrees, ranging from simple stitch abscesses to infections of the superficial and deep layers.

The average age of the 50 cases in this series was 44.7 years. Twenty-one cases were fifty or over, and two were sixty-eight years old. The youngest patient was twenty-three. The age of this group of cases is a full decade above that of the average hernia case operated upon in the Adult Service; this conforms to the later onset of direct hernia, and to the time of life when relaxation of the muscles and fatty infiltration of the tissues make the subject a poor prospect for cure by the simpler methods of operation. The added risk of a major operative procedure in the older individual is reflected in the mortality rate of one in 50 cases, or 2 per cent.

Sex. There were 45 males and 5 females in this series; the females were operated upon for umbilical hernia (1 case) and post-operative ventral hernia (3 cases), and inguinal hernia (1 case). It should be noted that recurrent hernia, the indication par excellence for this operation, is quite infrequent in the female, while direct hernia is very rare.

Types of Hernia. The following is a classification of the 50 cases with 63 hernias:

Type	No. of Hernias	No. of Recurrences
Recurrent inguinal.....	24	4
Direct inguinal (including sad- dlebag) .....	18	0
Indirect inguinal.....	11	1
Ventral (postoperative).....	7	1
Umbilical.....	3	0

Results. Excluding the case that died, we have 62 hernias in 49 cases for con-



sideration. There were 28 hernias in 23 cases which must be excluded either because they are not traced at all, or traced for less than three months, or are too recent to have had sufficient time elapse in which to estimate the result. Of the remaining 34 hernias in 26 cases, all of which have been examined at a period of at least three months after operation, the grouping according to duration of time followed is:

	Cases	Hernias
Over 3 months but under 6 months	7	10
Over 6 months but under 9 months	6	7
Over 9 months but under 12 months	3	4
Over 12 months but under 18 months	6	9
18 months or longer . . . . .	4	4
Total . . . . .	26	34

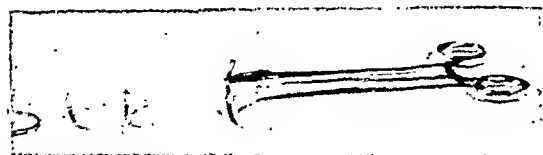


FIG. 9. Needle holder and needles used for fascial sutures

There were six recurrences in this series. Basing the recurrence rate only on the 34 hernias followed up, the percentage of recurrence is 17.9, while if the 10 hernias traced from three to six months are excluded, the results being based on 24 hernias traced six months or more, the rate is 25 per cent.

Seward Erdman, reporting from the New York Hospital upon the results of 52 traced operations for recurrent inguinal hernia, states that there were twelve secondary recurrences, or 23.1 per cent. In our series, there were 24 recurrent hernias with four recurrences, or 16.6 per cent; of these, fifteen were followed, which gives a recurrence rate of 26.6 per cent. It is our hope that continued efforts to recall those recurrent cases of which we have no follow-up notes, or those too recent to have fulfilled the requisite elapsed time, will result in a diminution in the percentage of secondary recurrences.

By "follow-up" cases we mean those that have returned to the hospital for examination by the several members of

the attending staff and not only by the operator. Letters from patients are not accepted by us as proof of their cure.

We realize that the three months minimum period is far too brief to designate the end results as permanent and even these represent a discouragingly small percentage of the total number of cases operated upon, despite the fact that a careful follow-up clinic is maintained to which all patients leaving our service are instructed to return for periodic re-examination. Moreover, letters are sent to all who fail to return and no case is closed until three notifications have been sent without response. Ignorance, indifference and frequent change of address are characteristics of the floating population



FIG. 10. Incisions (retouched).

from which our material is drawn and contribute to reduce the effectiveness of our recall system.

*Analysis of Recurrence.* Of the six recurrences noted in this series, four were in recurrent hernias, and three followed severe postoperative wound infection with sloughing of sutures.

We feel that the relatively high percentage of recurrence after the living suture operation, as shown in this series, should not be construed to mean that the

method is not productive of better results than the simpler, time-honored methods. Comparative statistics should be based on analogous groups of cases. This series of cases represents those (selected from a group of 400 hernias) which, in the judgment of the various operators, were poor prospects for cure by any other method. If the living suture operation is reserved for admittedly difficult hernias, statistical figures will always be misleading if compared with those obtained by simpler

or 0.6 per cent.

#### SUMMARY

(1) A series of fifty patients with sixty-three hernias all operated upon by living suture method is reported from the Second Surgical (Cornell) Division of Bellevue Hospital.

(2) The majority of these hernias were either direct, recurrent inguinal or ventral in type; and the age of this group averaged a decade above that of simple adult



FIG. 11. Operating room set up for simultaneous operations upon hernia and upon thigh for removal of fascia

procedures on relatively easily curable hernias. The excellent results by almost any method applied to the cure of indirect hernia in children corroborate this.

*Mortality.* There was one death, a mortality rate of 2 per cent. This patient was a male of fifty-six who succumbed on the seventh postoperative day of a rapidly developing postoperative pneumonia complicated by cardiac failure. In the 500 cases operated upon previous to the use of the living suture, there were three deaths,

herniotomies.

(3) The operation as performed by us is described in full with illustrations.

(4) There were six recurrences in 34 traced hernias, the period of observation ranging from three to twenty-one months.

(5) Postoperative wound infection was a complicating factor in 14 cases and was undoubtedly responsible for three of the recurrences, but did not seem to affect the end result in the other 11 cases. The presence of fascial sutures renders

wound infection more likely to occur.

(6) Barring wound infection, the post-operative course does not differ materially from that observed in simple herniotomy.

Statistics show an apparent increase in mortality. Whether this would be maintained in a larger series of living suture operations is doubtful. Care should be taken in the selection of cases for this more prolonged operative procedure.

(7) The operation is indicated in recurrent inguinal hernia, direct inguinal hernia, and large scrotal hernia associated with poor musculature. It is a valuable aid in dealing with postoperative ventral and large umbilical hernia. We regard it as a major procedure and reserve it for cases in which we feel it is distinctly indicated. The results of the operation should be judged with due consideration to the type of complicated hernia upon which it was used.

In conclusion we wish to express our appreciation to Dr. Harold E. Santee, Director, Second Surgical Division, Bellevue Hospital, both for the opportunity of presenting this material and for helpful suggestions in its preparation, and to Dr. Harlan Heim for tabulating the statistics of the 500 cases operated upon prior to the use of living sutures.

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# THE PETROUS PYRAMID

## ITS SURGICAL ANATOMY AND THE TECHNIQUE OF THE OPERATION FOR ITS REMOVAL

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THE object of this paper is to present such data as have been secured by operating upon eight cases for the removal of the petrous pyramid either in whole or in part, and to discuss from a surgical standpoint certain anatomical features of the pyramid having a bearing upon the technique of the operation.

First, there was a group of three-malignant cases (cancer) having as far as could be determined the middle ear as the original site of the lesion. Inasmuch as this group contributed no special features to the technique of the operation not embraced in the second or suppurative group but brief reference will be made to it. Generally speaking, these cases were characterized by excessive fetor, complete facial paralysis prior to operation, dead labyrinths functionally and an excessive tendency on the part of the bone to bleed during operation. In one of these the pyramid was traversed by numerous venous sluiceways of large size having no counterpart in the normal bone. These gave rise to excessive hemorrhage. All these cases succumbed, one having lived about two months after operation. In one of this group the disease had exposed the carotid artery throughout its course in the carotid canal, the vessel wall was involved, and the artery was accidentally injured in a manner to be referred to later. But for this accident to the carotid and such information as was obtained concerning carotid bleeding, this group contributed little additional to the technique of the operation. In all these cases the entire petrous was removed, no attempt being made to save any of its structure. The facial arch, the facial

nerve and the integrity of the internal auditory meatus were sacrificed.

Second, there was a group of five suppurative cases in which the extensive necrosis of the petrous was consecutive to mastoid and labyrinth suppuration. All of these cases recovered.

Three of the five cases occurred in the chronic type of middle ear and mastoid disease, the necrotic process involving in these cases the cochlear shell, the inner cochlear wall and modiolus. In two of these the pus in the cochlea was of a distinct canary color, the pus in the internal meatuses being of the same color. In all these cases there was a collection of pus in the internal auditory meatus and at the posterior petrous plane. In none of these could a facial arch be preserved owing to the location of the necrosis, and in none was the extreme tip of the pyramid removed, due to the fact that it was not involved, and being of diploic structure it had a better opportunity through good nutrition to survive than would have been the case had the bone been pneumatic in type. In all these cases facial paralysis followed operation, this being a necessity when the bony internal meatus is sacrificed. One of these cases presented many of the clinical features of a diffuse leptomeningitis minus the mental disturbance of hebetude and drowsiness. There were moderate continuous fever, positive Koenig sign and stiff neck; the cerebrospinal fluid was milky and contained short-chain streptococci in numbers. The spinal fluid was tapped daily or every second day over a period of two weeks following operation, the milkiness and streptococcic chains gradually disappearing. To all appearances the case

was one of recovery from diffuse cerebrospinal leptomeningitis.

In the second group (suppurative) two occurred in the course of acute mastoiditis which had been more or less neglected and had passed into what we might call, for the sake of description, the subacute stage. In both, the petrous was pneumatic. In the first the bone was highly pneumatic and of exceptionally large size; in the second the petrous was extremely small with its relations cramped.

The portion of the petrous removed in the second case comprised all that part of the pyramid lying above the level of the tympanic floor and extending from the base to the apex of the bone. In the first the removal was the same with the exception that there was preserved for the facial nerve an arch of bone extending from the facial ridge across the main axis of the pyramid to the internal auditory meatus. The plane of this arch or bridge was more or less transverse to the petrous axis, the outer end or pier being represented by that portion of the facial ridge corresponding to the level of the tympanic floor, the inner end or pier by a vertical rectangular plate or portion of the posterior petrous plane. The base of this inner pier represented a portion of the inner rim of the dome of the jugular bulb; the top of it included the internal auditory meatus. This entire facial arch was undermined, the removed portion representing the body of the petrous pyramid at that level.

In both these cases there was associated with the necrotic petrous an epidural cerebellar abscess situated at the posterior petrous plane in the vicinity of the internal auditory meatus.

In the second case this abscess had obliterated the meatus and filled its canal with granulations so that upon removing the modiolus and the bony internal meatus which separated as a sequestrum, there was no loss of cerebrospinal fluid. The base of the abscess was formed by a thick mass of exuberant black granulations such as is

met with in those sharply defined perisinus epidural abscesses of low infectivity where the sinus wall has had the opportunity through time to become enormously thickened.

In the first patient the abscess was adjacent to but had not encroached upon the internal meatus. Upon opening the vestibule in this case pus in quantity pulsed up through a perforation in the inner vestibular wall. The outer labyrinth wall was likewise perforated in the geometrical solid angle of the semicircular canal system. In this patient a large quantity of cerebrospinal fluid was lost through an accidental tear of the dura of the internal meatus.

The outstanding pathological feature in all these suppurative cases is the presence of a collection of pus at the posterior petrous plane either in the meatus or adjacent to it. In four the internal meatus was involved; in one it was not.

This epidural abscess situated at the posterior petrous plane deserves special recognition as a distinct clinical entity, not that it differs from epidural abscesses elsewhere but because of its surgical relation to the labyrinth, depending upon and having its origin in labyrinth infection. First, it is deep-seated, is liable to be overlooked or not looked for, has little or no chance of evacuating itself by traveling outward along the posterior petrous plane there perforating and revealing itself. It is silent in its manifestations if we expect headache, and it does not announce its presence through symptoms peculiar to itself. If overlooked it must result in death.

The first case of this group shows conclusively that the abscess may result from direct perforation by a suppurative process of the inner labyrinth wall. The other four cases point to the cochlea as the focus of infection and the modiolus as the path of infection.

Let us now turn to the modiolus and examine it as an avenue of infection to the intracranial cavity. First, it is a canalized pyramid of bone traversed from base to

apex by numerous soft structures which, as they reach the bony spiral shelf, are radiated out into the interior of the cochlea and there become immersed in labyrinth fluid. Infection may readily travel from without inward by contiguity along these structures to the interior.

Second, the modiolus stands in intimate relation not only to the labyrinth fluid but to the cerebrospinal fluid also. It is a porous structure with each end, so to speak, immersed in fluid.

Third, the cerebrospinal fluid penetrates out into the modiolus along the canals carrying the soft structures. This can be demonstrated in the living subject by gradually lowering the pyramid from its apex toward its base; a point is reached before the internal meatus is actually opened when there occurs a seepage of cerebrospinal fluid through the modiolus stump. This point lies above the level of the first cochlear whorl.

The act of respiration produces a movement in the fluid column of the cerebrospinal axis, causing it to ebb and flow, and I should like to consider briefly this influence as a possible factor in the spread of infection from the cochlea through the modiolus of the intracranial cavity. Let me mention a few facts to show how far reaching in its influence the act of respiration is upon the fluids and cavities of the body.

We see during this operation the effect of respiration upon such a cavity as the temporomaxillary joint when its capsule is exposed. Its effect upon the great cavities of the thorax and abdomen are well known, the tissues of the neck themselves aspirate. I have often noticed an infiltration of air resembling frog spawn beneath the deep cervical fascia when that structure has been nicked by accident in the jugular resection. The fluid columns of the great veins aspirate; the jugular in the neck is milked completely dry at each inspiration when its volume of blood has been diminished by thrombosis of the sigmoid above. We all have seen the sigmoid sinus aspirate, and to make manifest

this unseen force, which is forever active, it is only necessary to diminish through pressure with the finger upon the lateral sinus the volume of its current. I have seen the lateral sinus aspirate even after the sigmoid below it had been opened and blocked, aspiration having taken place through the jugular and the lateral sinus of the opposite side as was proved by the fact that pressure upon the opposite jugular caused a cessation of the phenomenon. I have also seen the mastoid emissary vein aspirate. Just as pulsation is transmitted to the remotest arterioles so this influence is carried to the minutest veins.

No doubt the very fluids in the tissues of the body are affected by this moving force of respiration which is complementary in its action to the driving force of the great arterial system with its elastic contractile coat. The fluid column of the cerebrospinal axis aspirates and moves with respiration; it pulsates also. This dual movement may be observed in the internal auditory meatus when the fluid column of the internal meatus has been exposed by destruction of the modiolus. The time for observation is when the fluid column of the meatus is in a condition of equilibrium and just presenting in the meatal opening.

This movement of the fluid to and fro in the internal meatus must exert a rhythmic suction upon the fluid penetrating the modiolus and through this porous pyramid create an interchange between the fluids of the labyrinth and the fluid of the cerebellar fossa. Certainly the factors necessary to such an interchange are present.

Just how gross this interchange is I do not know but a practical experiment could be carried out along the lines of staining the labyrinth fluid and making hourly examinations of the fluid of the internal auditory meatus to determine at what rate such an interchange takes place.

From a surgical standpoint and for the reasons I have stated I regard the modiolus as a bony sieve interposed between the labyrinth and intracranial fluids allowing a slow interchange between the two. A gross

interchange does not occur. The act of respiration through its influence upon the fluid column of the cerebrospinal axis plays a rôle in the dissemination of infection from the cochlear to the intracranial cavity and the opening of a normal labyrinth is the surgical equivalent of opening the subdural space.

The modiolus as an avenue for the distribution of infection to the interior of the skull is the most important structure of the labyrinth and in relation to the surgical pathology of this region it outranks all others. The cochlea is the great distributing focus.

We would surmise this on histological grounds and the frequent occurrence of pus in the internal meatus and at the posterior petrous plane in these suppurative cases adds its clinical support. There are certain factors that may simplify or complicate the operation, among which the following may be noted:

First, the size and structure of the bone. A pneumatic pyramid of roomy proportions makes the operation more easy, a small pyramid with its relations cramped the reverse. It would have been impractical in the second case of the acute group to have attempted to save a facial arch even though we had the choice of doing so, on account of the time it would have been necessary to have sacrificed in the attempt in a pyramid of such small proportions.

Second, the degree to which the pyramid has been softened by the disease, thus enabling any easy exenteration.

Third, as to whether or not we attempt to save a facial arch for the facial nerve. The operation is made much more difficult technically if we elect to make this attempt. The extent and location of the necrosis decides this question for us.

Fourth, as to whether or not the internal auditory meatus is obliterated. If it is, as in most of the suppurative cases, the operation is very materially simplified.

Fifth, as to whether or not there is a loss of cerebrospinal fluid, either through injury to the dura of the cerebellum or

injury of the internal meatus or modiolus. If the loss of fluid occurs, aside from its dangers it is a severe handicap.

The first step in the operation includes the mastoid, the radical, and the labyrinth exenteration. Perhaps it would be better to say that it is during the labyrinth exenteration that we first become aware of the necessity of having to remove the pyramid in its entirety.

One of the things demanded by this operation is room, that is, working space, and every effort should be made to secure this from the first. At the earliest possible moment we should come to a decision as to whether or not an attempt is to be made to preserve a facial arch. If so a considerable portion of petrous squama should be removed at once. This allows the dura of the temporosphenoidal lobe to be lifted so that the arch which is to include the facial nerve may be outlined, and it allows of work being done over this arch down upon the deep apical portion of the pyramid.

All work upon the apex (when the arch and internal meatus are preserved) must be done in a relatively small space, that is, through a triangular opening with the dura above the facial arch below, the modiolus internally and the convexity of the anterior wall of the auditory meatus externally. The convexity of the anterior wall of the external auditory meatus is a considerable hindrance to us and it might be thought that by sacrificing it we could gain room. This, however, fails of its purpose inasmuch as the capsule of the jaw joint makes a distinct excursion during the act of respiration and keeps alternately projecting into and retreating from the operative cavity, which is very annoying to the operator. It is much better to shave down the convexity of the anterior canal wall to the utmost but not to expose the capsule of the joint.

If the structural character and degree of necrosis permit, I think it is better to first exenterate the petrous and later remove its shell; otherwise the dura of the



posterior and middle fossae bulge into the wound, constrict the operative field, which is extremely deep, and close it to successful view. Retraction of these structures is then necessary but the best retractor is the shell of the petrous pyramid as it commits no trauma, occupies no space and is accurately applied to the surfaces to be supported.

A second reason for first exenterating the petrous is that the dura enclosing the superior petrosal sinus is firmly attached to the upper margin of the posterior aspect of the pyramid and separates with difficulty from its uneven lip. In consequence the vessel may be torn and a hemorrhage which is difficult to control may follow, for it is not easy to place a compression plug between the dura and the bone as the two do not readily separate. If this accident to the superior petrosal is to occur, it is more convenient to have it occur toward the end of the procedure.

By first exenterating the petrous we render the operative field relatively clean. If then we lose cerebrospinal fluid through accidental injury the danger of infection is not quite so great. In removing the main body of the petrous the chiseling should be done, as a rule, in a direction that parallels the petrous axis. To facilitate this we should remove the bone covering the vertical limb of the sigmoid sinus from the knee down and continue the removal of bone backward over the lateral aspect of the cerebellum for a distance sufficient for our purpose.

In separating the cerebellar dura from the posterior petrous plane we are liable to tear this membrane. This accident may occur in Trautman's triangle before we have reached the level of the semicircular canal system but we are more liable to this injury the deeper in we proceed toward the apex. It is an unfortunate accident and is attended by danger. I have seen meningitis in three instances follow as a result of it. Nor is it an accident that it is always possible to avoid because the posterior aspect of the pyramid, as we pass

from without inward, presents increasing irregularities of contour which enhance firm dural attachment. Now and then are to be seen jutting from the posterior aspect of the bone little sharp flat spicules to which the dura is firmly anchored or over which strands of dura pass. From these spicules these dural strands separate with difficulty.

When the tear in the dura occurs it generally takes place along a line parallel to the petrous axis. It may be a thread-like slit quite invisible except at such times as cerebrospinal fluid is escaping. To avoid this accident it is safer to separate the dura from above downward and from within outward rather than from without inward, for reasons to be mentioned later.

The feature that renders this injury peculiarly dangerous is that the rent in the dura may not close for weeks. I have seen it persist for three weeks after this accident during which time the cerebrospinal fluid leaks intermittently into the operative cavity and the subdural space is open to its infection. The following factors are to be considered in relation to this injury:

The cerebellar dura of this region as compared to the temporosphenoidal dura in this operative area is more tightly stretched. It does not sag forward, nor permit the same degree of bulging of the encephalon into the rent and the sealing off of the subdural space.

The cerebellar mass is better cushioned from its corresponding dural surface by cerebrospinal fluid than is the temporosphenoidal mass and its position is less favorable to a closure.

Following this injury there may occur for hours a continuous leakage of cerebrospinal fluid sufficient to keep the dressings and bandage wet. Then follows a period of cessation, a period of no flow, during which time the cerebellar mass may block the opening in the dura; but this is only temporary. Later it is floated away by the reaccumulation of cerebrospinal fluid and then follows a period of releakage. This cycle of leakage, closure, and releakage is



very characteristic of injuries to the cerebellar dura of this region. It does not occur in similar injuries to the temporo-sphenoidal dura; here a bud of encephalon pouts into the wound and quickly, and as a rule permanently, seals off the subdural space.

During this entire period of non-closure the act of respiration through its influence upon the cerebrospinal fluid column, causing it to ebb and flow, must contribute materially to the dissemination of infection to the interior. In fact, there occurs in this injury the same sequence of phenomena that may be observed upon the shore of any lake, the cerebrospinal fluid column representing the body of water, the tear in the dura the shore line, the act of respiration the moving force which impels the water to and fro, the infection of the operative cavity the drift which is sucked back to contaminate the interior.

Where the attempt is made to preserve a facial arch our aim should be to leave this arch, for the sake of nutrition, as thick as possible, not only at its bases but throughout. If necrosis has so involved the arch that it is imperative to thin the bridge down to a minimum, we incur the risk of an exceedingly irritating accident, namely the fracture of the Fallopiian canal. When this accident occurs a section of the arch becomes a detached fragment of bone with the nerve running through it, that is, an annulus which may be slid up and down on the nerve just as a ring on the finger. The part most liable to this accident embraces that portion of the Fallopiian canal just above and behind the oval window. Here the contour of the canal is semi-exposed. It is exceedingly thin and sclerotic at this point and the canal is crossed by planes of cleavage which are constant. It is the unexpected fracture of the bone along these planes which results in the accident. By making the stroke of the chisel parallel to the central axis of the pyramid and by placing the point of the stroke successively inward so as to approximate nearer and nearer its central axis, it

may be shown that the bone cleaves along planes which emerge further and further forward on the inner tympanic wall, that is, higher and higher up toward the apex of the pyramid. This is but another way of stating that the anterior aspect or face of the petrous shell is shingled; and this conception of the structural character of the shell is extremely important in its relation to our technique when attempting to preserve the facial arch.

When confronted by this accident the problem is how to remove the annulus without injuring the nerve. As I have had to deal with this accident in the living let me cite a few of the mechanical difficulties which will better enable the reader to visualize the problem.

First, the facial nerve is an exceedingly soft structure; it may readily be mashed between the thumb and finger. Under the conditions of the accident it is suspended at each exposed end from a rigid bony canal with sharp cutting edges, and this allows of no lateral displacement of the fragment, in fact no displacement in any direction without injury.

This makes it imperative that the little ring of bone surrounding the nerve be held absolutely firm and rigid during any attempt to remove it. There must be no jiggling of the fragment, no shaking. To avoid shaking, a fulcrum for the crushing instrument is necessary and only one hand can be dedicated to that instrument.

Again, the little annulus cannot be crushed by any instrument whose action is transverse to the course of the nerve as there are no points of appliance. Its action must be tangential to and in the long axis of the nerve. Whatever instrument is used it must secure its grip upon the ends of the annulus and likewise this holds true for the grasping instrument that steadies the fragment. Both instruments must work in the same plane. These conditions in a cramped space impose a severe handicap.

A thin thumb forceps with the ends drawn almost to points and rigid enough to keep

accurate approximation under pressure is one necessity. A straight rongeur with small beak and small cutting cups evenly apposed, I have found to be a serviceable instrument.

I think an instrument could be devised that would better meet the mechanical conditions, namely one with a straight rongeur handle with cutting blades instead of cutting cups and with which a longitudinal section could be split from the annulus through which the nerve could be released. Such an instrument would not be unlike certain types of nail clippers on the market.

This little annulus will tax the ingenuity of any operator to deal with it and at the same time leave the nerve uninjured.

Generally speaking, when attempting to carve out a facial arch all work should be done in a plane perpendicular to the petrous axis and a thin sharp chisel is the instrument of preference.

Let us now return to the modiolus and consider a few features of its surgical anatomy, for it is a treacherous structure and in this operation is always liable to injury.

As generally thought of and described, the modiolus is a pyramid. This description carries with it the inference that it decreases gradually in size from base to apex. Surgically this conception is erroneous and may result in disaster. In fact, one of my earlier labyrinth cases lost his life through my failure to appreciate the true character of the modiolus.

The modiolus more nearly represents a section of a cylinder than a pyramid, the outer end being slightly smaller than the inner. Upon the cochlear end of the cylinder is a slight and surgically unimportant little spicule of bone. The inner end or base of the cylinder is somewhat excavated and its marginal rim is seated circularly upon the outer end of the internal auditory meatus. The cylinder lies prone and juts out centrally into the cochlear cavity. Under the conception that the modiolus is a pyramid it might be thought that it

could be gradually lowered with safety from its apex to its base. While its apex is its weakest point the next weakest point is not just below the apex but at the extreme base. Should a stroke be made with the chisel at a point just below the apex with the idea of lowering the pyramid to gain freer access to the anterior portion of the cochlear cavity the modiolus fractures not at the point of the stroke but at its extreme base, and it fractures as one piece. The internal auditory meatus in consequence is opened across its entire diameter and there follows immediately a sudden and copious discharge of cerebrospinal fluid into the operative cavity sufficient to fill it in a few moments. This flow is impossible to control. The fluid is of low gravity and does not coagulate. Gauze packing does not stop it, wax may do so, but as a rule does not. The flow ceases only when a sufficient amount of intracranial fluid has been lost to establish equilibrium. This may take a considerable time, in fact hours. This accident is an absolute hindrance to further operative procedure aside from the danger it imposes.

The operator is particularly liable to this accident when opening the cochlear shell for it must be remembered that the modiolus sticks up like a little tentpole in the center of the cochlear cavity. One is apt to commit this injury with a curette. This is the most dangerous of all instruments in cochlear work and should not be used inasmuch as when using it the operator unconsciously seeks some point as a fulcrum and the modiolus from its position can scarcely escape being that point.

Also when operating upon the apex of the pyramid just anterior to the cochlear shell great care must be taken to let no instrument press upon the modiolus. This is not as easy to avoid as one might think, particularly if the petrous is a small one with cramped relations. The actual distance between the modiolus and the wall of the external auditory meatus is

very slight indeed, and we are required to work through this space. When in addition we must work over a facial arch which is fragile, beneath the lifted dura of the temporosphenoidal lobe, down into a deep cavity with the carotid at its bottom, and there remove portions of bone that are sclerotic and attached to the cerebellar dura, we get some conception of the difficulties encountered. I know of no situation in otologic surgery that is comparable to it.

As a result of the fracture of the modiolus and the opening of the internal auditory meatus with the loss of intracranial fluid there may follow a train of symptoms that has been described previously in a paper on the labyrinth but to which I shall refer again. With the too rapid drainage of the cerebellar fossa there may appear a small, rapid, irregular pulse, embarrassed respiration, which may assume a Cheyne-Stokes character, an anxious concerned expression, cold extremities, pinched livid features and marked restlessness. These symptoms may be of such an alarming character that death seems imminent but with the lessening of the escape of the cerebrospinal fluid the whole picture may in the course of a few hours so completely change that the patient appears quite normal. These symptoms are undoubtedly due to a too rapid drainage of the water-bed of the brain whereby the important nerve centers at the base, having lost their elastic support, sink and are brought in undue contact with the floor of the skull. The quick disappearance of these symptoms upon the cessation of the escape of cerebrospinal fluid forbids any other than a mechanical interpretation of these phenomena.

This train of symptoms is more apt to follow an injury to the internal meatus or modiolus where the flow is rapid than from an injury to the cerebellar dura. The freedom with which the fluid escapes after injury to the modiolus, taken in conjunction with certain anatomical features of the internal meatus, such as its non-collapsibility, its position relative to

the floor of the cerebellar fossa and the contained fluid, and its being the avenue along which infection has frequently traveled, suggest its utilization as a drain to the cerebellar fossa in cases of purulent meningitis of labyrinth origin. For a good many years I have utilized the meatus in this way and while I have not succeeded in having a case recover through this measure, the distressing picture of a progressive meningitis has often been so ameliorated through the relief of intracranial pressure that the patient has passed from the condition of coma into that of perfect consciousness and remained so for weeks, even as the purulent meningitis progressed.

By far the safest and most practical instrument to use in this operation is the chisel held parallel to the petrous axis. It is dangerous to attempt to remove sclerotic portions of the pyramid with the rongeur, for by the sudden snapping of its jaws sharp slivers of bone may be driven through the dura. I have seen this accident occur. The manner in which the sclerotic portions of the pyramid fracture or separate when attacked with a rongeur is incalculable. The bone may fracture or cleave along a plane that extends far beyond the bite of the forceps.

For this reason, the dura adjacent to the pyramid should always be well separated before any attempt is made to remove any portion of the petrous shell. Otherwise we get splinters of bone which, while detached from the pyramid, are still attached to the dura and this is particularly liable to result in a dural tear. It was in this way that the carotid artery which I have previously referred to was injured.

The technique of any operation for the removal of the petrous pyramid to be successful must embrace in its conception something more than the mere ability of the operator to carve out a facial arch, avoid the internal meatus and remove such portions of the pyramid as are diseased or dead. It must take into consideration the

structural character of the pyramid, the nutrition of the bone and the nutritional changes that may take place subsequently in portions of healthy bone allowed to remain.

I wish to discuss briefly the structural character of the petrous pyramid from a surgical standpoint. A familiarity with the structure of the pyramid is absolutely essential to the operator and can be acquired only through cadaver work.

First, if the cutting edge of a chisel is held parallel to either petrous plane, the superior or the posterior, and the stroke is delivered in the axis of the pyramid we may sliver the bone in the corresponding plane.

Second, if in removing the petrous shell we place the cutting edge of the chisel at its base and make the stroke parallel to the petrous axis, maintaining the cutting edge of the chisel parallel to either plane, the bone will not only sliver along that plane but this plane of cleavage will emerge upon or cut the corresponding face of the pyramid at a point considerably deeper in toward the apex than the point of application. In other words, the petrous pyramid is shingled. Each face of it is shingled and it is shingled in the reverse order of a roof. It is the emergence of these planes upon the posterior face of the pyramid that gives to the posterior surface those little spicules and points to which the dura may be attached and the separation from which may produce the dural tear previously discussed. It is for this reason that in separating the dura from the posterior petrous plane the separation is more safely done by working from above downward and from within outward.

Surgically we should think of the pyramid as being formed by the successive overlapping of plates or scales laid down in order, from apex to base. It is as if each plate when laid had slipped slightly outward so as to expose its predecessor. It would follow, then, as a natural inference if we accept this idea of the structural

character of the petrous, that the nutritional vessels distribute themselves along planes that correspond to the planes of cleavage; that is, the nutritional planes and the planes of cleavage are coincident.

The petrous pyramid appears to be built up much in the same manner as stratified rock, each leaf in the latter being due to sedimentary deposit from an overlying sheet of water; in the former, each scale of bone to bone deposit from an adjacent or overlying nutritional plane.

This arrangement of the nutritional plane relative to the bony structure of the pyramid would, I think, explain the phenomenon of scaling which is to be observed after extensive operation upon the sclerotic labyrinth. Subsequent to operation, it may be weeks afterward, we notice that a portion of the sclerotic structure, which we regarded as normal and healthy at the time of operation, dies. The disorganization of structure does not take place by the ordinary process of caries, the bone dies in scales; and the death of bone is more certain to occur if a mass of it rises as a prominence above the general plane of bone removal. It would appear that if a nutritional plane is intersected or cut, the bone external to it is not only apt to die but to separate in one piece as a scale along a plane of cleavage.

If we accept this view of the structural character of the sclerotic portion of the pyramid it will have a profound bearing upon the technique of the operation. For instance, the first question to present itself would be, is it safe to attempt to save a facial arch? May the arch not die subsequently by having its nutrition interfered with. That a healthy arch may die I can vouch for. If it should die would not the nerve fare worse than if the arch were sacrificed at the time of operation and the nerve abandoned to scar tissue? No doubt it would, for in those cases where this was done and the nerve exposed throughout its course across the pyramid and abandoned to a new environment of blood clot and subsequent scar tissue the paralysis

in these cases, while permanent, has by no means been complete.

That an arch may live even in a highly pneumatic bone the first case illustrates. While the limited number of cases we have had does not entitle us as yet to an opinion, my impression is that a longer experience will prove that it is not wise to attempt to preserve a facial arch in a bone of a highly pneumatic type even though the bone corresponding to the arch is sound. If the attempt is made the wound should be allowed to fill with blood clot so as to give the maximum nutritional conditions.

Again, if upon removing the main body of the petrous above the level of the tympanic floor we find as we approach the apex, that the portion of the apex lying above the general plane of bone removal looks healthy should we leave it? My belief is that we should not but should continue the removal of the petrous shell to the extreme apex of the pyramid along the general plane of bone removal, destroying all bone above that level, except in those cases where the apex of the pyramid is of diploic structure.

In the first group of suppurative cases the extreme tip was left in each case with success as the bone in each instance was diploic.

Surgically, we should think of the temporal bone as possessing two tips: one the mastoid tip placed vertically, the other the petrous tip or apex lying horizontally. Years ago it was recognized as a mistake to leave the exenterated mastoid tip as a thin shell; it too often underwent necrosis and necessitated reoperation. Its routine removal has been incorporated as a sound principle in mastoid surgery. More liberty may be taken in leaving a mastoid tip of diploic character, and I think the same general conditions hold true of the petrous apex, with this difference, that should the shell of a pneumatic petrous apex die subsequent to operation reoperation would be practically impossible and a fatal result would in all probability ensue.

Let us now take up the carotid artery for consideration. The carotid is more frequently exposed through erosion of its canal in chronic suppurative middle ear disease than is generally supposed. When thus laid bare the vessel shows no visible pulsation. If a thin layer of blood is allowed to collect upon it, serving as a mirror, the light reflex thrown back reveals a faint but scarcely noticeable pulsation; it requires close scrutiny to observe it. Within its canal the artery has suddenly become converted into a vein; its wall is no thicker than that of the sigmoid sinus; its middle coat is lacking or undeveloped; there is no necessity for its development as the canal gives the necessary support. The outer wall of the artery is but loosely attached through small filaments to the interior of its canal and is readily dimpled away with a cotton applicator. Its attachment to its canal is not nearly so treacherous as is that of the sigmoid sinus at the sinus knee.

The carotid canal serves a twofold purpose. First, as the exposed artery shows no visible pulsation, it is evident that the carotid canal acts as a bumper to the pulse wave receiving its impact and shielding the brain from excessive shock.

Second, as the canal is rigid and does not permit the artery to dilate, it has the practical effect of constricting that portion of the artery within its grasp. The effect is the same as when with the fingers we constrict the lumen of a rubber tube through which water is being forced by a rubber bulb; that is, there is the tendency under these conditions for the intermittent or remittent current to approximate a continuous stream. The carotid canal, therefore, not only protects the brain from pulse impact but it is a mechanism by which the inflow of blood to the brain is regulated and made more even and continuous.

It is the complementary arrangement on the arterial side of the circulation to the goose-neck mechanism of the sigmoid sinus, the jugular bulb and the collapsible jugular vein on the venous side of the

circulation whereby aspiration of the great sinuses of the skull is modified and an even outflow of blood from the brain is guaranteed.

In the malignant case, where the carotid artery had been exposed throughout its course in the carotid canal and the artery was accidentally injured, the first thing to attract my attention was that the bleeding was essentially venous in character. There was an even continuous flow of blood from the vessel similar in every respect to that from an injured lateral sinus. There was no pulsation to the stream, no spurting of blood to indicate that the current was under any considerable degree of variable pressure, in fact, quite the contrary. I was struck by the apparent sluggishness of the flow. A similar injury to the wall of the lateral sinus would have resulted in much greater bleeding, not merely in volume but in vigor. The current of the sigmoid and lateral sinus is a much busier stream than that of the carotid artery in the carotid canal, and gives the impression that it is actually under greater pressure. One thing is certain, the carotid canal stills the pulsating column of blood before it is passed on to the brain. This had been surmised some years ago.

The bleeding from the artery was readily stopped with very little pressure and much more easily controlled than bleeding from a similar injury to the sigmoid sinus. One factor that possibly contributed to the ease with which the bleeding was controlled was that the artery was exposed throughout its entire diameter and over a considerable distance. I think an injury to a semi-exposed artery would have been more difficult to handle. There would be no chance under such circumstances to enlarge the exposure by bone removal, thereby gaining better advantages for the application of pressure. Under such conditions, were the bleeding from the vessel of the ordinary arterial character I am sure that the hemorrhage would dissect away the artery from its canal and that there would follow a most extensive extravasation of

blood all along the course of the vessel, both above into the intracranial cavity and below into the neck. But in the actual case, while no autopsy was obtained there was no evidence whatever that this had occurred even in the slightest degree. This patient lived but a few days after operation but there was no further hemorrhage from the vessel.

I see no reason why an uninfected clot should not undergo organization just as readily in the artery as in the sigmoid sinus, for the carotid artery in the carotid canal has the essential properties of a venous sinus with the exception that it carries arterial blood.

In view of the frequent exposure of the carotid artery through erosion of its canal in chronic middle ear suppuration it is surprising that this vessel is not frequently the seat of an infective thrombosis. I have never met with such a case but the factors necessary to its occurrence are often present.

A point of interest occurs in connection with the eyes in these cases where the extreme tip of the petrous pyramid is removed. Upon emergence from anesthesia both pupils may be dilated ad maximum as if atropine had been instilled. This dilatation in the first case continued for several weeks, gradually subsiding. In a second case the pupil corresponding to the side of operation was considerably dilated over its fellow though not ad maximum; six weeks subsequent to operation this pupil still showed moderate dilatation. In each case the pupils reacted to both accommodation and to moderately strong light. These pupillary phenomena result, in all probability, from disturbance of the carotid plexus when the extreme apex of the pyramid is removed and is due to an irritation of the sympathetic fibers.

The point of decussation in the sympathetic fibers as they pass forward to the iris evidently takes place either at or anterior to the petrous apex. This, in conjunction with the pupillary dilatation of the peculiar character above referred to,

may bring out a point in intracranial localization which would be of value.

Several of these cases have complained for years after operation of severe recurring headache. This is in all probability due to the extensive area of dura subjected to cicatricial contraction.

In closing, let me point out that the operation is one of magnitude; many vital structures lie across one's path. The structure of the sclerotic portions of the pyramid is treacherous and the bone often fractures in a manner which is incalcu-

lable. Situations arise to make judgment difficult in the absence of experience. Long training in cadaver work is absolutely essential to the operator. The technique of the operation in its final form may vary somewhat from that which I have presented in this paper. Enough, however, is already known to make us feel a sense of pride in the fact that it is the otologist who is called upon to perform what is undoubtedly the most highly technical and difficult operation in all surgery.





# ELECTROTHERAPY *vs.* SURGERY

## IN CERTAIN ABDOMINAL AFFECTIONS\*

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TO those actively engaged in gastroenterology there is apparent a change in the viewpoint of surgeons regarding the advisability of operative procedure in certain abdominal conditions. To one thing more than any other I believe this change is due to the ever increasing numbers of cases in which symptoms persist, or are aggravated, or in which new symptoms appear after operation. The same conditions are even more aggravated after a second operation performed for the purpose of correcting the damage resulting from the first operation. These have become the bugbear of the surgeon and as a result, rather than have the stigma of a large series of uncured or unrelieved operative cases hanging over his head, he is now content to have other procedures tried first. Some of the conditions that particularly fall under this head are gastric and pyloric ulcers, chronic cholecystitis, adhesions about the cecum often diagnosed and operated upon for chronic appendicitis, and also pelvic adhesions. It is because of this attitude of the more conservative and conscientious surgeon that a field has become opened to the electrotherapist that is as fertile for good results as any other in which he has been working. All of the above conditions are better treated with the aid of electrotherapy than by any other method. At this time it might also be said that, when necessary, to electrotherapeutic procedure must be added proper diet and occasional medication for the more immediate relief of symptoms and to assure comfort to the patient.

In order to obtain the best results with electrotherapy and to prevent undue criticism from those who are still opposed to its use it is essential to obtain as accurate a

diagnosis as possible. Every available means should be utilized and this is particularly so in abdominal disease where the roentgen ray and other useful tests afford so much information. The rule should be "no diagnosis, no treatment." Begin with the roentgen ray and coordinate these findings with the results of the examination of stomach contents, stools, blood and urine. Above all, obtain a complete history and make a thorough and careful physical examination. If there is any question at all about the diagnosis seek proper consultation. Do not jump to hasty conclusions. Do not make snap diagnoses. When the diagnosis is established as well as it is possible to make it then will be the time to institute the proper treatment by electrotherapy.

What are some of the abdominal conditions that offer themselves for electrotherapy or where electrotherapy should be given a thorough trial before surgical interference is resorted to? This can be answered briefly by saying that any case that does not require immediate surgical intervention is a fit case for electrotherapy. Acute pus conditions, as indicated by symptoms, blood examination or physical examination; indurated ulcers; frequent or severe gallstone or appendicitis attacks, these are the cases that are strictly surgical. Chronic conditions aside from these are suitable for electrotherapy. These are gastric and duodenal ulcers, perigastritis, periduodenitis, chronic cholecystitis with or without adhesions, adhesions about the cecum with or without an associated chronic appendicitis, adhesions involving other parts of the intestinal tract as evidenced by the roentgen-ray examination, pelvic adhesions, chronic oöphoritis or salpingitis

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and postoperative adhesions about the gall-bladder region, stomach, cecum, colon or pelvis.

With the exception of gastric and duodenal ulcers, when one considers the pathology of these conditions just enumerated it will readily be seen how futile are medical measures or rather drug therapy alone. It is true that considerable relief may be derived but an ultimate cure does not seem possible for any lasting period. It is also true that at times one does achieve some excellent results that persist for a long time but these cases are very few in a long series. With gastric and duodenal ulcer however, although as many as 80 per cent of these can be relieved by any rational type of ulcer diet and medication, nevertheless these cures can be aided and hastened by suitable electrotherapeutic means. It can also be stated that damage can be done by improper electrotherapeutic means, as will be shown later. As a matter of truth the object of medical measures alone in all of these cases is to allay symptoms, either locally by soothing agents coming in contact with the irritated parts or generally by lowering nervous tone through the action of sedatives so that with the use of these means it is hoped that nature will have a better opportunity to restore the parts to normal. However, when actual damage has been done either with definite destruction of tissue or by the formation of new hyperplastic tissue, other means must be tried. The only other means are surgery and electrotherapy.

With surgery there is always the possibility, aside from postoperative complications, of aggravating the condition it attempts to correct. This is very well seen in the operative treatment of postoperative adhesions and with cholecystitis with adhesions. Then, too, through the trauma attendant on the handling of the abdominal viscera, surgery can also produce further undesired changes. In this way adhesions at a point away from the site of the operation may be produced. Further still, other conditions present beside that for which the

operation is undertaken may become aggravated. This is a frequent occurrence in cases where there is an associated mucous colitis, particularly present with chronic appendicitis or pelvic disease. Inasmuch as there are so many unfavorable points attending operative intervention it becomes almost imperative that electrotherapeutic measures be utilized before any other means are attempted. Fortunately, considerable excellent work has already been done in this field in this country and abroad, and perusal of the literature will be sufficient not only strongly to impress one with the usefulness of electrotherapy but also to give actual experience and the technique with which the results were obtained.

In this paper it is proposed to mention the more common conditions that may properly be called the borderline cases and to point out how and why electrotherapy offers the best means of cure or relief.

Beginning first with ulcer of the stomach or duodenum consider for a moment the pathology present, irrespective of the etiological factor which, to be sure, must be sought out and treated properly, if found. An ulcer represents an erosion of the mucosa, an actual destruction of tissue. This erosion may be small or large. It may be shallow or deep and even involve the muscularis. Its depth may be great enough to set up an inflammation beyond the serosa such as a perigastritis or a periduodenitis. The edges of the ulcer may be in a healthy granulating state or they may be hard, thick and indurated. The ulcer may be the result of focal infection and the crater may be inhabited by the organisms that were responsible for its production in the first place. It may have resulted from an anemia of the part due either to blood-vessel injury or nerve disturbance. The function therefore is to restore the parts to normal by a reversal of the processes that were responsible for its production. This is accomplished first by putting the part at rest either by having the patient in bed, by his giving up laborious work or by the use

of sedatives. To help the condition further there is used protective medication and non-irritating diet. The progress of healing can also be aided by measures that stimulate the tone and resistance not only of the part involved but the body as a whole. For this we have an excellent means in the ultraviolet lamp. Not only has this the power of building up resistance through various agencies, such as the endocrine system, and through changes in the blood stream, but it also has an excellent sedative action on general nervous tone.

It is immaterial whether the source of the ultraviolet rays is the quartz mercury vapor lamp or the carbon lamp but it is important that whatever lamp is used must produce beneficial ultraviolet rays of proper wave length and in sufficient amount and intensity. This can be ascertained only through a definite knowledge of the properties of the individual lamp being used. It has been found that considerable relief from symptoms may be obtained from the use of a phototherapy lamp. The action of this lamp is undoubtedly zonal, affording relief through the nerve endings in the skin over the affected part. When both lamps are used better results are obtained when the phototherapy lamp is used first. Under no circumstances should diathermy be used. It cannot be known whether the ulcer is in proximity with a bloodvessel. It is possible to produce hemorrhage or even perforation by diathermy. I have known instances of such happenings from diathermy when applied by men not properly qualified.

In the treatment of adhesions it is essential to understand the nature of their structure. This is very important since much that is fallacious about adhesions has crept into the literature in the past few years and considerable harm is apt to result from these fallacies. When one reads such literature the impression is obtained that intra-abdominal adhesions are as simple to handle as structures more superficial and more readily accessible. Such expressions as softening adhesions,

breaking adhesions, dissolving adhesions are frequently used by writers unacquainted with their nature. Those familiar with the appearance of adhesions as seen at the operating table usually have much respect for them. Adhesions which are fibrotic in nature vary in density, that is in fineness or in thickness just as fibrotic tissue in any other part of the body. The best comparison would be to mention the similarity of adhesions to scar tissue. Scars may be very fine, or they may be thick and tough as seen in keloids. The same problem attending their treatment presents itself in the treatment of intra-abdominal adhesions with the greater difficulty in the latter case of treating something that cannot be seen, that is treating structures blindly and without knowledge of their actual density. In some books and in many articles it is stated that adhesions are best treated by first applying diathermy to soften them and then using the surging sinusoidal current to break them after they have become softened. It is assumed that the regular movements of the intestines are stimulated by the surging sinusoidal current sufficiently to break the adhesions irrespective of their density. It can readily be seen that any surging movement of the intestine sufficient to break adhesions would be sufficient to cause other damage.

The problem as it has presented itself to me is not a question of separation, softening or breaking adhesions so much as it is to repair the damage produced by the adhesions, build up the tone of the parts affected by the adhesions, and in this way lessen the effects of the adhesions. Adhesions cannot be cured any more readily by electrotherapy than they can by surgical or medical means. It is, however, possible to cure the attendant conditions produced by them. Some of these attendant conditions may be secondary gall-bladder inflammation, duodenitis, typhlitis, colitis and even inflammation of the pelvic organs. It is a rather interesting thing to point out at this time that whereas adhesions are,

as a rule, the product of inflammatory processes they also are responsible for the continuation of the inflammatory process after the acute cause has disappeared. It is also plausible to assume that were it not for their presence the inflammation would have subsided much sooner or that it would have entirely disappeared.

Symptoms of adhesions may manifest themselves at some distance from the site of the lesion. It is well known that the symptoms are the result of stimulation by way of the nervous system through reflex arcs. The lesion itself is inflammatory in nature, is the result of trauma produced by the irritating action of the adhesions on the part to which they are attached. There is interference with muscular movements resulting in spastic states. There is interference with nerve stimuli and with circulatory conduct, resulting in blood stasis and poor nourishment of the part. Hence, the things that must be considered for correction are:

1. Reduction of the irritation.
2. Relief of the inflammation.
3. Reduction of spasticity.
4. Stimulation of the circulation for the removal of blood stasis.
5. The building up of tone and resistance of the part.
6. The lowering of nervous hypertension of the patient as a whole.

Electrotherapy has at its command excellent means for producing all of these changes. Of the various means the best are phototherapy and diathermy. The large phototherapy lamp with a 1500 watt bulb is focused over the affected region for its zonal effect and for producing counter-irritation. In this way it acts as an analgesic and makes the part to which it is applied more receptive for the application of diathermy. Diathermy, which acts more deeply on the affected part through its hyperemic action, overcomes stasis by constantly bringing fresh blood supply to the part, thus aiding in the healing of the inflamed area and building up tone. Through its action on the nerve endings in

the affected part it overcomes spasticity, relieving the symptoms resulting from this. As a result of the combined action of the phototherapy and diathermy general nervous tension is restored to normal, metabolism is stimulated and a feeling of well-being results. As for the adhesions which were the initial offenders, what becomes of them? They probably remain the same as before the treatment. It is difficult to assume otherwise. Cherry, working with cases of pelvic adhesions, thought that the adhesions in cases treated by this means became less dense and more friable than those in untreated cases. He based these conclusions on a few cases that came to operation for other causes and in which he was able to note the appearance of the adhesions. In my cases, approximating about 400, I have found in a few roentgen-ray films taken before and after the treatment some changes in the outline of the affected parts in the gastrointestinal tract. In most of the cases no changes were evident. Further than this, in some cases that were ultimately operated upon adhesions were found in which it was impossible to say that actual changes such as softening or breaking had occurred. In spite of this the one fact that stands out is that as many as 80 per cent of the patients have remained well and free from symptoms, some as long as four and a half years.

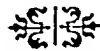
What has been said about adhesions in a general way applies to adhesions irrespective of their location, whether of cholecystic, cecal, intestinal or pelvic. It also applies to postoperative adhesions. The technique used was the application of the phototherapy lamp for twenty to thirty minutes over the affected region two or three times weekly. The more often the treatments the better and quicker the results. This is followed by a twenty minute diathermy treatment. The size of the electrodes and the milliamperage depend entirely on the part treated and the tolerance of the patient to the current. As I have warned before in another publication, I must warn again here against

the use of too small electrodes and too great a current in the obese. The resistance built up by the fatty tissue is sufficient at times to cause actual changes therein. This is manifested by the formation of very tender nodular masses, varying in size and located under the skin. The patients state that these masses feel like boils or abscesses. They persist for as long as two or three weeks.

During the past four and a half years I have given thousands of electrotherapeutic treatments in abdominal conditions, and I have become fully impressed with its value and its future. Before that time our treatment of these conditions was either medical or surgical and there resulted a host of that class of patients often referred to as the "chronic incurables." We were hounded by these as is every other internist or surgeon using medical or surgical means. They are the only black spots on an otherwise successful practice. With this method of treating them I personally welcome them for it is indeed a pleasure to be of service to these patients who would otherwise be operated upon with a further aggravation of their condition.

Physical therapists have an important and valuable part to play in the treatment of abdominal disease. We have a future in this unequalled in any other field in phy-

siotherapy. Not only has our work importance from the standpoint of the results that can be obtained but it has a value in the building up in the minds of the laity a feeling of confidence in the conscientious physician, a feeling which has been somewhat slipping as a result of both poor postoperative results and propaganda by what might be called the non-medical cults. We must also demonstrate to our surgical confrères that we are not seeking to steal their thunder but rather to work with them, and that by leaving these cases to the electrotherapists it will be to their credit to have a greater percentage of cures in their operative cases. There is no question but that the more conservative surgeons will gladly accept our cooperation, but in order to instill in them confidence in our ability to make good our claims regarding favorable results by electrotherapy we must be in a position to accomplish the results we claim. To do this I must emphasize again very strongly the necessity of correct diagnosis, proper selection of cases and a knowledge not only of the choice and technique of the proper modality for these cases but also a knowledge of the pathology of the condition we are attempting to treat. With the possession of this knowledge we can follow out the treatment intelligently both to its successful end and to our own credit.



# TRANSACTIONS OF THE NEW YORK & NEW ENGLAND ASSOCIATION OF RAILWAY SURGEONS

*Thirty-Sixth Annual Meeting, New York, October 23, 1926*

## FRACTURE OF THE FEMUR\*

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NEW YORK CITY

**F**RACTURE of the femur is a surgical emergency and the immediate treatment should be confined to the splinting of the bone in the axis of the limb with sufficient traction to overcome secondary displacements. For this purpose no apparatus is quite as satisfactory as the Thomas splint, which should be available wherever thigh fractures are apt to occur and the method of its application should be sufficiently well known to make its use practically universal. Misdirected attempts at reduction at the site of the accident only produce further local injury and shock to the patient. In my opinion, no femur fracture should receive any except emergency treatment at the site of the accident, and the subsequent treatment should be carried out by a properly qualified surgeon in the proper surroundings and with the proper armamentarium, which, reduced to simple terms, means at a hospital. I cannot see any valid objection to the transportation of an individual with a fractured femur once the proper emergency splint has been applied and except in rare instances a hospital is always accessible.

In any discussion of fracture of the femur the age incidence is of great importance. The important age groups will vary, but it has been my practice to make three age groups:

1. From birth to twelve years.
2. From fifteen years to forty years.
3. From forty-five years up.

In the first group, from birth to twelve years, the commonest type is fracture of the shaft. The results in this group are good if the axis of the limb is reestablished and, if the gross overriding and lateral displacement are corrected, growth will take care of the shortening and correct it in the majority of the cases, as demonstrated in the series by Burdick and Siris. Manipulation and traction usually suffice and open reduction is reserved for those cases in which the interposition of the soft parts or periosteum prevents bony contact between the fragments. Direct fixation after reduction need be used only if the fragments cannot be maintained in position by any other method.

In this age group the cases of epiphyseal separations at the hip and at the knee require complete anatomical reduction, which should be obtained by that method applicable to the given case; and unless thus obtained reduction by open operation is necessary. There is a definite exception to this statement in the epiphyseal separations in infants and very young children, in that many of the epiphyseal separations, although uncorrected, show the formation of a new shaft with normal

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development of the bone after a suitable interval. It is a moot question to decide in which cases this happy outcome will take place.

In the second group, from fifteen years to forty years, a great variety of lesions may be found. The commonest are those of the shaft and the character of the line of fracture is variable, that is, transverse,

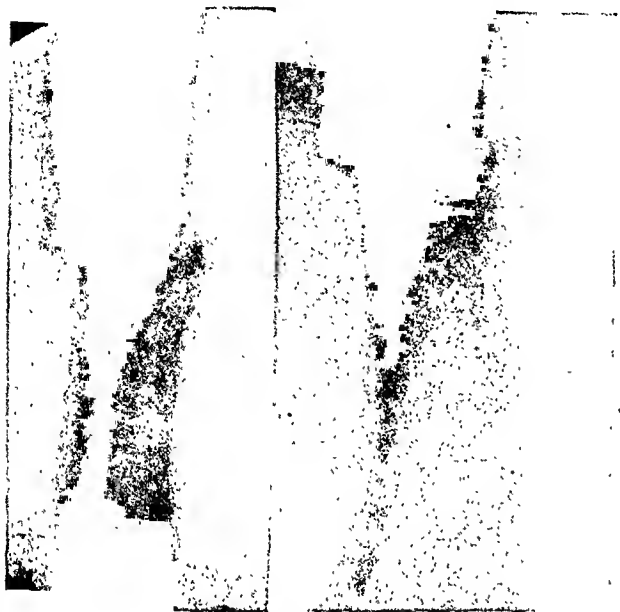


FIG. 1. Transverse fracture of the shaft of the femur. Reduced by manipulation under an anesthetic within two hours after the injury. Incomplete reduction. Complete functional return without shortening. Period of disability, seven months.

oblique, spiral and comminuted lines of fracture occur with varying degrees of frequency in any given series.

In this group manipulation under an anesthetic will succeed in producing a satisfactory reduction only in very rare instances, viz., in the transverse fractures in individuals with weak muscles when the reduction is done within two hours after the injury.

**Traction:** Adhesive or skin traction is applicable to only a small group of selected cases in which the displacement is very slight, which can be corrected and in which the correction can be maintained by such traction.

Skeletal traction by means of the pin or by tongs is perhaps the most satisfactory method at present in use; it is not a simple

method. It requires skill and training and a proper understanding of the result to be accomplished before it can be intelligently used. The impression extant, that if tongs or a pin are applied and traction is obtained by this means on the femur, "the deed is done" has led and will lead to unsatisfactory results. To be used properly skeletal traction should correct the over-

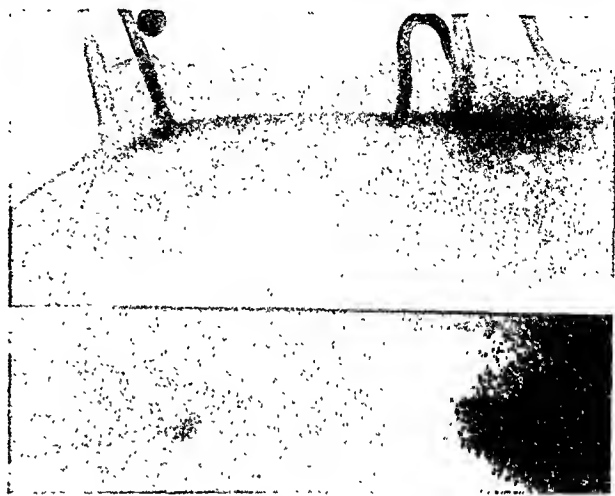


FIG. 2. Oblique fracture, mid-shaft of femur. Skin traction by the Stimson method in Hodgson's splint. Incomplete correction in the lateral plane. Complete functional return without shortening. Period of disability, eleven months.

riding, bring the ends of the bone into apposition and bring the axis of the femur into the correct weight-bearing line for the individual. Complete anatomical replacement is seldom obtained.

Emphasis should be laid upon the fact that the femur is not a straight bone. It has a curve peculiar to the given individual and to obtain a satisfactory late result the curve peculiar to that individual must be restored. The application of the tongs or pin is the least important of the steps in the treatment by skeletal traction. The supervision of that traction and the restoration of the weight-bearing axis by abduction of the leg, flexion of the hip or knee or body, counterpressure or countertraction on the fragments are essential, if the end-result is to be a good one.

It is in this group that most of our difficulties arise since it is in this group that the larger portion of individuals with

powerful muscle groups are found. Here also are found the cases in the most active period of industrial life with the greatest need for return to their full earning capacity.

That that return is not at present being accomplished is unfortunately the case. In 96 cases of fracture of the shaft of the femur treated by skeletal traction in the metropolitan district of New York City reviewed by me to establish the amount of

joints due to faulty posture. It is no longer satisfactory to consider disability and shortening a necessary outcome of fracture of the shaft of the femur. It is not always possible to obtain all that we strive for, but that does not offset the necessity for doing all that can be done to produce the best possible result; and a perfect functional result with a return to full earning capacity should be our goal.



FIG. 3. Lateral view of oblique fracture of mid-shaft of femur. Treated by tongs traction. Incomplete correction. Complete functional return. Period of disability, six months. The case was a compound fracture, and the skin wound was excised and closed. Primary repair of the superficial wound.

disability, only four had completely satisfactory results, while the remainder had to be given industrial ratings from 60 per cent to 100 per cent disability of the leg and in one case with a fracture of both legs a total bodily disability had to be allowed because of the result.

The disability may involve the knee, the thigh muscles and the foot, with limp due to shortening and secondary changes in the

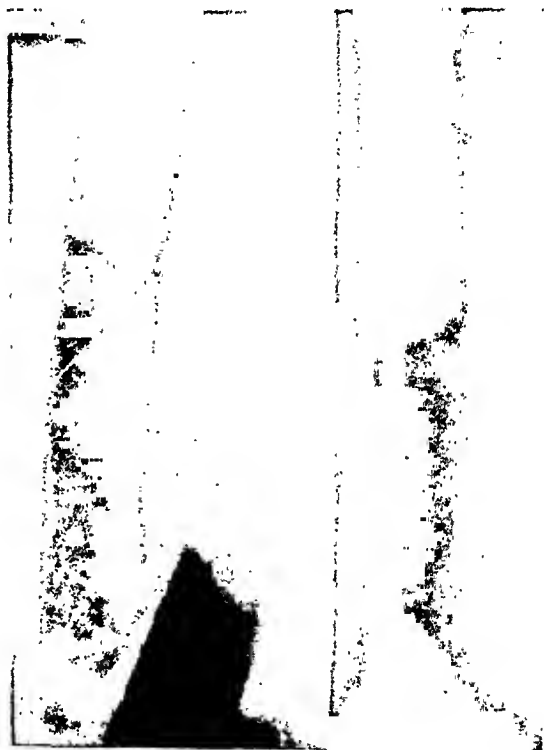


FIG. 4. Left: Transverse dentate fracture of the middle third of the femur. Muscle penetration by the sharp prongs on the lower fragment. Treated by open operation.

Right: Result of the operation with six-screw Sherman plate. Period of disability, six months. Complete functional result. Plate has been in position since February, 1915, without causing symptoms.

Angulation or displacement at the site of fracture has been one of the many difficulties in traction by tongs even under careful supervision. Doctor N. W. Cornell, my Associate on the Fracture Service at the New York Hospital (Cornell Division), has evolved a method which combines skeletal traction with plaster fixation and which so far has met the above difficulties.



A description of his method is to be published.

With regard to the open operation and the use of steel plates in fracture of the femur, wisely used in selected cases, it is of the greatest value especially in that group of cases most difficult to correct because of the powerful muscles, the interposition of soft parts, etc. Operation is seldom



FIG. 5. Fracture of the mid-shaft of the femur. Treated by tongs traction, showing one of the failures of tongs traction spoken of in paper. The lateral view shows very marked angular deformity of the shaft with the apex backward. There is also a lateral angular deformity with the apex inward.

required in individuals under twenty and should rarely be used in those over forty years old. It is not a method to be used by the occasional surgeon who is not properly equipped and it is a nice point to decide which surgeon has that equipment. That there are men so fitted that they use steel plates and the open reduction with great satisfaction cannot be disputed, and Sherman's clinic in Pittsburgh is a good example. To the surgeon who has any doubt about the matter the only admonition which can be given is: don't use the method; use any other method, because safety first is better than regret after.

The time of the operation is also of the greatest importance. There is a marked difference between operations done before the twelfth day and those done after

fifteen or twenty days. The early operations disturb the normal bone formation but little, whereas later operations interfere with the normal sequence of bone repair and the plates cause trouble. This disturbance in the normal sequence of events in bone repair is emphasized by Hey Groves as one of the chief factors in non-union, delayed union and, in my opinion, in infections and secondary muscle changes, with limitation of motion in the knee joint, so often reported.

The bone plate has a distinct place in the treatment of fracture of the shaft of the femur and I have used the plate in 98 cases with one death and two infections that necessitated the removal of the plate. All three cases were improperly selected and I would not now operate in similar types. In the remainder there were no non-unions, no stiff knees, no plates removed and, except for the muscle atrophy in the line of the scar, no changes in function or in the anatomy worthy of note. Ninety per cent of the cases were returned to their previous occupation without disability.

After forty, operation should be considered only when the operation will give a result that will compensate for the greater risk connected with the operation; and in the older people that method of treatment should be selected which will fit the needs of the case, that is, the treatment should consider the patient as a whole and not the femur alone.

From forty-five years upward fractures of the femur tend to involve a different area and in the older patients the most common lesion occurs at the neck of the femur. Here also are found a group of subtrochanteric fractures which offer difficult problems for solution.

The abduction method of Whitman with the application of the plaster splint has given results so much better than the other methods that except in rare instances it is the method of election for fractures at the neck of the femur.

Repair of the fractures in cases involving the narrow part of the neck with a satis-



factory extremity may be expected in 50 to 60 per cent of the cases. My own figures are 66 per cent. In fractures through the base of the neck involving the trochanters repair and the functional result are always good.

In the rarer cases of shaft fractures the treatment selected must be adapted to the individual patient and the patient as a whole studied to determine how much can safely be done. After fifty some disability is bound to occur in all cases and it is far more important, for this group, to save the life of the individual than to obtain a perfect anatomical and functional result.

Diabetics, nephritics, cardiac and arteriosclerotic patients present a multitude of problems to be considered in treating fractured femurs. Hence, before resorting to any treatment the whole of the patient must be studied and that treatment pursued which will fit the individual case most satisfactorily.

Gentleness and the avoidance of further injury are, as Darrach has stated, of the utmost importance in elderly individuals.

The reading of this paper was followed by the exhibition of 52 lantern slides, including illustrations of Dr. Cornell's method of combining skeletal traction with plaster of Paris fixation.

### *Discussion*

DR. ARMITAGE WHITMAN (New York): It is a very difficult task to discuss a paper in which one finds practically nothing to discuss. Dr. Hitzrot has skimmed the cream off his subject so briefly, so admirably, that there are very few things I find myself prepared to say. I notice a slight note of defiance in his tone as he mentions his application of the Lane plate and his employment of the open reduction of fractures. He evidently expected to be violently disagreed with on this point. I think, myself, in properly selected cases and in the hands of competent operators this operation is one of the most nearly indispensable that we have.

I was also pleased to hear him say that skeletal traction for fracture of the femur is difficult and complicated and requires skillful maneuver and should also be left only to the hands of those competent to apply it.

From the orthopedic aspect, which I suppose I am expected to dwell on, there is only one thing I have to say, and that is, I heard him mention getting his patients with fracture of the femur, in which he used plates, up in ambulatory splints at the end of three weeks. I think this is very commendable, very bold. I should hardly dare do such a thing myself. Of course we must realize, I think, that the treatment of fracture of the femur does vary according to the surroundings of the patient, the class of the patient, the patient's physical condition and the abilities of the man who is applying the treatment.

This is now very much the age of standardization. The American College of Surgeons is busily engaged, through its various committees, in establishing standard treatment for all types of fractures. I think it is a very commendable effort, but I do not believe it is ever going to work, and I should imagine in associations such as this, that is of railway surgeons dealing with traumatic cases, that various surroundings would find themselves particularly opposed to this standardization.

A treatment that may be successful in a special fracture ward, for example, of a large hospital will be absolutely inapplicable in a small one, where the surgeon cannot give the case his daily personal attention.

We have, therefore, at our command three methods of treatment, that is by traction in suspension, by plaster of Paris and by open operation. All these methods are good in certain hands and in certain cases. They have their advantages and they have their disadvantages.

Traction in suspension is comfortable for the patient. It allows motion in the joints of the fractured limb. In skilful hands it is a most excellent treatment for almost any type of fracture. On the other hand, I know of no treatment in unskilful hands which is so difficult of application and so unsuccessful in its results. Incidentally, it is entirely at the mercy of anyone who comes in contact with the patient, or at the mercy of the patient himself. He may slide around in bed, disarrange his weights, pull his ropes off the pulleys, and, in general, render the treatment entirely futile. It is undoubtedly, as I say, in special wards in large hospitals a most valuable method of treatment.

Second is the plaster of Paris treatment, which, until the Great War, was the method almost universally employed. There again,

plaster of Paris properly applied is comfortable. The patient is absolutely under the supervision of the person who has applied the cast and, in the majority of cases, the fracture having been once reduced and plaster of Paris applied, the thing is finished. You are comfortable in your own mind for about two months, at least.

On the other hand, plaster of Paris not properly applied is the most uncomfortable dressing that could possibly be devised, and very dangerous, as it exposes the patient to the risk of bed sores, and I have seen patients practically killed by its application.

The third method of treatment, that is of open reduction and the application of Lane plates, in skilled hands, has most beautiful results. In unskilled hands its results are tragic.

What I mean by all this is that I hope before I die to see people who are treating fractures of the femur, or fractures anywhere, skilled in these three methods of treatment, and that each case will be judged according to its own merits, according to the surroundings in which one finds it necessary to treat the patient, and according to the particular individual skill of the man who has the case in his charge. Therefore, I hope in the future that the treatment of fracture of the femur will be the treatment not of standardization but the treatment of election.

DR. EDWARD WALLACE LEE (Randolph, N. Y.): Treatment of the fracture of the femur is a tremendous question. From what I see going on now and from what I have seen in the past, it has not yet to my mind reached anything like a satisfactory status.

During the War fractures were handled in a great many instances in what I thought was a ridiculous manner. Everything was done to get a satisfactory roentgen-ray picture, and I have seen fractures put up and taken down a dozen times in an effort to accomplish this. Of course, a roentgen-ray picture is absolutely necessary; but before we had the roentgen ray we did not get good functional results in fractures, and since its advent there has been so much disturbance in trying to get an alignment corresponding to what the picture demands as a good result that the patient is often worn out, union is delayed and there are unsatisfactory results, just because the extremity was manipulated day in and day out in order to get a perfect picture.

There are several indications that are demanded in a fracture. In the first place, proper adjustment, proper alignment. If you

can get that, and then establish traction, and something to hold the bone in alignment, you have accomplished all that is necessary. There has been too much fussing with fractures.

DR. BAKER (Rochester): I would like to ask Dr. Hitzrot in his open reductions what type of preparation he uses, particularly as to the length of preparation, the type of skin preparation, etc.

There is one thought that I have in regard to the cases that are beginning to show circulatory decompensation. I have been having some very happy results in the use of plaster by turning the patient first on one side and then on the other side, tipping the bed up at the foot, and lastly turning the patient directly over on the face, to eliminate as nearly as possible the risk of hypostatic conditions of the chest. Indeed by this method I have been fortunate in not having any signs of the stasis.

DR. WILLIAM B. COLEY (New York): Dr. Hitzrot brought out one of the most important points of all when he said that in most cases, particularly with middle aged and elderly people, the treatment of the patient comes first and the treatment of the fracture comes second. He also emphasized very truly, I believe, the importance of selecting a method in accordance with the experience of the man who is going to apply that method, which is particularly true with the question of plates. There is a very great difference of opinion as to the value of plates in the treatment of fractures.

Two years ago at the meeting of the American College of Surgeons, Hamilton Russell, the leading surgeon of Melbourne, Australia, told me that he never used the plate in his practice, and believed it very unwise to do so. On the other hand, Sherman of Pittsburgh, as Dr. Hitzrot has said, has very brilliant results with the Lane plate. I think those who are not familiar with the operation, not qualified to carry out the proper technique, had better leave it in the hands of someone who is qualified.

I have one end-result that might be worth calling to your attention. It was in a case where plates were used. A soft tumor of the humerus started about a year later at the site of the plate, and was probably caused by the constant irritation of the plate. There is one method which I think might be used with fruitful results: instead of putting in foreign bodies of bone plates, splints, or screws, we accomplish equally good results by putting

the bones in perfect apposition and holding them in place by heavy kangaroo tendon. I had one occasion in which this method was tried, after several attempts were made at reducing the fracture of the neck of the humerus in which the upper end of the fragment was in the axilla, and three or four weeks later there was a very firm union, and I had a perfect anatomical and functional result.

I am inclined to agree with Dr. Whitman that the perfect and complete standardization of practice is not the ideal, at least, for railway surgery, and we must rely more upon the election method, selecting the methods that are best for the individual case in regard to both the anatomical condition and the age of the patient; and I do not believe that the perfect standardization of practice will ever become entirely practical, even if it may be theoretically ideal.

DR. O'NEILL: I was struck by something that Dr. Whitman said about the possibility of getting motion in an open suspension. I have had a number of cases where the tissues about the wound were very much traumatized, and I felt that I would like to wait before getting a permanent fixation for some restoration of those tissues, and in that waiting I have known that my fixation has been disturbed several times, sometimes by the patient and sometimes by outside influences, and the point I would like to raise is for how long a period may I wait with a feeling that the bones when they are put in that position will reunite?

DR. B. T. TILTON (New York): I am a strong advocate of traction by the use of the calipers, with reservations. I believe that people who have not tried this method do not realize that it has in it certain very serious dangers of infection, and even of death, and for that reason the insertion of the caliper should be looked upon as a major operation, in my opinion, and should never be done in the ward but always in the operating room under the most careful technique. Furthermore, it should not be done in every case, especially if there is any wound which could possibly be contaminated in the vicinity of the surgeon's calipers and also when there is any fracture in the vicinity of the joint. I think there is grave danger of infection of the joint if one puts calipers in where the joint is already invaded by the line of fracture, but, if we pick our cases, I think that practically 90 per cent of them are suitable for this treatment. I believe we have here the most

ideal method for the treatment by traction. As Dr. Hitzrot said, in the cases in which we use the skin traction there are seldom anatomically perfect results. We were satisfied with the half-inch to one-inch shortening in almost every case, but, since we have introduced traction by the calipers we can get in many cases (I will not say in 100 per cent, but in a very large per cent of cases), we can get anatomically perfect results without any shortening whatever and with very good alignment, but, of course, the cases must be very carefully watched to accomplish this. If we find a person intractable, if he does not cooperate, if he takes off his traction, etc., of course, we have to change our method; but otherwise there is no reason why, with a daily looking over of the case, daily revision of the traction, we should not get in practically every case a good result.

I read a paper in Cleveland two years ago (Dr. Coley may remember it) before the New York Central Railroad Surgeons' Association, in which I showed a good many cases of traction by this method. An orthopedic surgeon of Chicago who preceded me had virtually said in his paper that the method of choice in practically all cases should be operative; and his claim was that there was no way of getting anatomical results except by open operation and the insertion of plates. One of the discussers waxed very enthusiastic and said, yes, he agreed with that speaker and he would even go further; he would say that 95 per cent of all fractures of the femur should be treated by open operation. He said that was the only way that an end-to-end result would be obtained. Then I exhibited my pictures, which showed in about a dozen cases an absolute end-to-end approximation and perfect alignment with this by calipers; and a very favorable result was obtained in bringing down this enthusiasm for the open operation, which I think was a very important thing. Dr. Coley at that time in the discussion emphasized the fact that it was very dangerous for a meeting of railway surgeons to say that the open operation was a method of choice, because, if you are going to operate openly, you have got to have the technique of an absolutely perfect operating room.

DR. HITZROT: First as to the method and the standardization of methods in the treatment of fractures. It is not so much the method that is used as it is the way in which that method is used. A good method badly carried out cannot produce a good result, whereas a

poor method well carried out may produce a very satisfactory result.

Dr. Whitman and I might find many points of disagreement such as the use of circular plaster splints, but the orthopedic surgeons are marvels with plaster and until the general surgeon becomes as proficient in its use it is wise for us not to condemn it too hastily. I notice that Dr. Blake states in one of his publications that when he expects to use plaster after an operation he has an orthopedic surgeon apply it for him.

In reference to standardization: if we can standardize the human ideas upon such things as politics, religion and prohibition perhaps we may standardize the treatment of fractures. We can agree on what the results should be, but the method for obtaining that result will have many variations.

The question of the choice of any method of treatment must depend upon the equipment of the man. My old chief, Dr. Stimson, had some very definite ideas about fractures and when I had something new or something radical in the handling of fractures it had to run the gauntlet of his criticism. When I could convince him, I was sure that the method had something to commend it. One can standardize the handling of fractures by placing the care of such cases in the hands of men equipped to take care of them. By that I mean by the so-called "fracture service" in a hospital. By this method the result can be improved as it will draw together a group of men interested in fracture problems as it has done at the New York Hospital.

One of the gentlemen said that correcting the axis of the limb was all that was essential. In the weight-bearing bones shortening may and often does produce poor late results. In 1912 I published some results in cases of fracture. Since then I have been able to follow about 25 cases of fracture of the femur, reported in that paper, in which there was shortening of more than one-half inch and which at the early period showed a very satisfactory functional result. Many of these cases now have some disturbance in the knee or hip which has gradually developed with use. The disability has been relatively greater in those cases in which there has been a divergence from the normal axis of the limb together with the shortening.

What was said about too much fussing with fractures is quite true. In one case that I saw

recently, a fracture of both bones of the forearm, eleven attempts at reduction were tried in three days and the arm was in terrible shape due to the increased injury produced by such manipulations.

In fracture of the femur our procedure is as follows: An immediate examination of the leg to determine, first, that there is a fracture; second, its location; third, the amount of reaction in the soft parts. If the swelling is marked, a Thomas splint with traction is applied and a roentgenogram made. If the swelling is not marked and if the roentgen-ray picture can be made immediately, we splint the extremity in a Thomas splint and wait for the roentgen-ray film which helps to visualize the fracture. If a roentgen-ray apparatus is not available, we make a detailed examination under an anesthetic, and institute treatment with an attempt to correct the axis and length of the bone by manipulation or by caliper traction, etc. With the roentgen ray we can eliminate cases in which the line of fracture would make impossible any reduction by manipulation. One manipulation is all that should be necessary for, if the first one fails, the second one is not very likely to succeed. The further procedures are discussed in the paper.

Concerning the preparation of the patient before operation: If possible the limb is shaved, washed with a cream composed of equal parts of lime and soda to be removed by sterile water, and the area is wiped with alcohol and ether on the day before the operation. On the day of the operation the ether and alcohol preparation is repeated and the operative area is wiped with 5 per cent thymol in alcohol in the operating room. Tinker and Sutton in their examination of the skin disinfected in this way find it sterile. Just what virtue the thymol has in the immediate process is a question, but it keeps the dressings sweet and prevents the decomposition of the blood with the foul smell so often met in these operations a few days after the operation.

With regard to the use of plaster of Paris and the movement of the patient: In cases with decompensation of the heart, plaster may be a valuable dressing to allow changes in posture. Acute dilatation of the stomach is one of the annoying complications in these cases and unless this is recognized early and treated energetically by the stomach tube, the patients do very badly and I have lost two or three cases which might have been saved had the condition

been recognized early. The difficulty lies in the recognition of a dilated stomach through the large plaster splint.

Dr. Coley raised a point as to the constant irritation of the plate. I can only say that in the cases I have shown here by lantern slides all of the plates have been in twelve years or more. Whether they are causing irritation or not I do not know, but they show no signs of irritation in the roentgen-ray plates and the patients have no symptoms. I believe you can put steel in a bone just exactly as you can put steel in a tree. I mean I think it is an analogous thing. I am doing some experiments on trees with these foreign bodies, and I am trying to study what happens to them.

With regard to the removal of the plates: I have been fortunate enough to have seen some cases in which I have taken out plates after twelve or fourteen years. They are not cases of my own and I would like very much to have one of my own to take out, but these happened to be cases of the other man. The plate was all right, not causing any trouble, or sign of irritation roentgenographically, but some pain in the region of the fracture. No irritation was found in the bone that the microscopist could determine, but there were some deposits of sulphide of iron in the tissues around the bone, and that was all. That is all I can say with regard to plates. I do not know what to say regarding the use of the kangaroo tendon. It may be of interest when I say that I have taken knots of kangaroo tendon out of bone that have been in there a year and six months. All this is a question of the absorbability or non-absorbability of these various things. I think we have wasted our time discussing that question too much. During the period in which the introduced substance is of any use whether it be absorbable or non-absorbable, it is a foreign body; and as to whether it is absorbable afterward, if nature is going to take care of it, she will take care of a non-absorbable as well as an absorbable body, if there is no infection; and personally, I do not feel that in the majority of cases kangaroo tendon answers the question.

Now, that is like everything else; it is again a question of choice of method. I have just recently operated on a fracture of the tibia in which I used kangaroo tendon to fasten it, because it seemed the best method for that particular case.

A MEMBER: How about a metal band, the Parham band?

DR. HITZROT: We have quite a little to learn about the Parham band. I think it disturbs the circulation. I think it has a place, a very distinct place in the treatment, and I have used it about twenty times now, especially in fractures in the humerus and fractures of the radius. In a fracture of the tibia it gave a very bad result.

Regarding the question of the patient's cooperation in traction, there are many points: Motion at the line of fracture during traction is supposed to be prevented by the weight producing the traction. There is an essential feature in traction which has been emphasized by every man that has used it, and that is, one must put on enough weight to pull down the lower fragment quickly. Do not put on weight gradually; one of the things we hear is to put on a little weight, then a little more weight and a little more weight. That is absolutely wrong. If you are going to use 60 pounds put 60 pounds on right off, do not put on 25 pounds today, 10 pounds tomorrow and so on. As soon as you get the bone down you will need only a small amount to hold it in position, so if you use sufficient weight during the time when the patient is very restless, the weight itself will keep him from disturbing the fracture line by muscle pull, unless he is an unusually powerful man.

With traction, you will be successful if your patient will cooperate, but you will not be successful if he is going to slide down and get the traction apparatus pulling against the foot of the bed, because you can not lengthen the bed sufficiently to keep the traction working, and if he is going to disengage the pulleys, or do as one patient of ours did, cut all the ropes that were suspending the apparatus. What is the use of trying to use traction unless you have cooperation on the part of the patient?

With regard to the question of infection with the tongs, I think that is not as important a question as it would seem to be. Infection about these wounds, if you do not get pressure of the tongs or the pin on the skin is not apt to occur. In my experience one of the reasons that infection occurs is failure to pull the skin up and then make the incision, so when the traction comes on the tongs pressure does not occur at the lower angle of the skin wound. In all the cases I have seen where it was said there had been an infection at the wound, this was due to the fact that there had been pressure

on the skin by the tongs at the lower angle of the wound. That point was made by Pearson, who was the advocate of tong traction during the war.

A MEMBER: Have you ever seen any osteoporosis?

DR. HITZROT: Only in one case in which there was infection at the same time. Dr. Cornell is at present working on that particular question.

A MEMBER: Does that increase the amount of new bone that is thrown out around the fracture during healing?

DR. HITZROT: I do not think so. I did not have time or I would have shown you plates at twelve-year intervals, and all you would notice is the normal repair process you would find in any bone; an amount of thickening just like a plumber's "wipe joint"; the medullary canal is reestablished, and there is not any more than a normal thickening in the cortex of the bone; the callus has undergone the secondary change.

A MEMBER: Is there any difference in the quality of the new bone that is thrown out,

whether with open operation or not?

DR. HITZROT: I do not know, but I do not think so.

DR. LEE: In what class of cases was acute dilatation of the stomach after these fractures most likely to take place? Did they have stomach disturbance before, or is vasomotor disturbance created by this dilatation of the stomach?

DR. HITZROT: I can only say that it occurs in all types of cases apparently, with no particular preceding gastric disturbance. The decompensation and other cases have some gastric disturbance due to their broken compensation. But in one case just recently, with tong traction, in a man who had nothing at all wrong with his stomach dilatation occurred.

DR. BAKER: In all these cases I put the plaster on over the abdomen, and a window is cut as soon as the plaster is dry, so that the abdomen or the stomach region is entirely uncovered and acute dilatation of the stomach is very quickly discovered in the beginning.



# THE MANAGEMENT OF HAND INFECTIONS\*

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TO secure the best treatment for infection of the hand, we must begin before an accident occurs. We must eliminate or recognize the diabetic, the nephritic and other chronically ill employees by the periodic health examination. We must impress upon those who handle men that the extent of the injury bears no relation to its seriousness; that the disability from a slight injury neglected, is often greater than that of an extensive one, properly cared for. Finally, we, ourselves, must clearly differentiate the various pathological processes as they are presented. This paper does not deal with epidermophytosis and its allied subacute conditions.

There is a group of infections about the finger-ends that is interesting. The pulp of the finger may be considered as a closed space. Here the epithelium is exceedingly thick. There are no hair follicles or sebaceous glands. A peculiar and important thing is the arrangement of the connective tissue strands which separate the fat bundles. They run at right angles to the bone, in contradistinction to the *dorsum*, where they are parallel. These connective tissue strands are very strong and thick, and at the end of this anterior closed space they run from the skin to the end of the phalanx.

Infection in this pulp space gives intense throbbing pain, limited to the distal phalanx. Lateral incision is best, because it will open these fibers running at right angles and allow free drainage. If this is not done there may develop an osteomyelitis of the distal phalanx which is due to the shutting off of the blood supply

of the diaphysis of the terminal phalanx by the pressure in this closed space and invasion by the offending organism. The flexor tendon protects the blood supply of the epiphysis. The roentgen ray or the probe may make the diagnosis. Sometimes the bone is discharged as a sequestrum and then rapid healing takes place.

The finger nail rests on a nail bed, which is highly vascular and sensitive. The lateral aspects of the nail are overlaid by the nail fold; the proximal edge or root of the nail extends farther under the nail fold than do the lateral edges. In all but the slightest cases of paronychia the pus is situated between the proximal part of the nail bed and the root of the nail, which is usually lifted off the bed, though the exposed portion of the nail commonly remains attached. From here we find the pus working laterally to gain the superficial aspect of the nail and oozing out around the fold. This condition often begins with a slight injury around the nail.

The treatment consists in the use of an anesthetic and an incision to free the *root* of the nail, which should be *removed* if there is pus beneath it, as it acts only as a foreign body and delays healing. A piece of mesh or rubber tissue is applied to keep the incision open, and the finger is kept in a hot dressing of Dakin's or boric acid solution for twenty-four hours either by using a rubber tube in the dressing or soaking the part in a bath. Never incise the matrix of the nail longitudinally because it leaves a split nail.

A splinter or bit of steel may carry infection into the end of the finger just beneath the nail. Drainage should be instituted,

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removing part of the nail if necessary. Hot, moist dressings usually suffice.

As we go back along the finger we sometimes find infection on the dorsum, due to infected hair follicles, and carbuncle of the finger is not unusual. In its presence, one should always examine the urine for sugar. The hot, moist dressings are applied after crucial incision to the limit of the indurated area under an anesthetic. At the metacarpophalangeal joint is the proximal closed space which communicates with the palm of the hand, and here web abscesses (so-called collar button abscess) and subcutaneous abscesses may communicate to the palm. It is not an uncommon thing for men who work with shovels to have abscesses develop beneath the calluses at the base of the fingers. The symptoms may seem out of proportion to the appearance of the blister, and yet there may be an abscess under the deep fascia, which here is the transverse metacarpal ligament. Pus here may spread and involve the tendon sheath, lumbrical muscle, digital vessels or the bone. Successful treatment results when we remember all the possibilities and are not satisfied with just taking the top off the blister.

Mock of Chicago in reviewing 1600 cases was struck by the rarity of cases of streptococcic infection of the hands of those employees who had streptococcic sore throats; usually the infection is by staphylococci.

The lymphatic distribution often causes us to err in placing our incisions, because usually we incise where the greatest swelling is located. In the hand this does not secure the best results. The lymphatics from the fingers run for the most part to the dorsum of the hand, following the veins so that we see swelling of the back of the hand due to this and also to the fact that while the palmar fascia prevents swelling on the palm, the loose arrangement of the subcutaneous tissue on the dorsum favors it. Lymphatics from the palm run to the dorsum, and we sometimes incise here when the pus is ventral. The lymphatics

follow the veins up the arm, and in acute infection the red streaks are familiar to us all. The glands just involved may be the epitrochlear, if the infection is on the outer aspect of the hand, or the axillary if on the inner aspect. The infections result from insignificant wounds with virulent organisms or poor resistance. If a focus is found, open it. Then apply hot, Dakin or boric acid solution dressings, mercurochrome and splints, and give morphine for pain; also hypodermatoclysis and transfusion if needed. Splinting in a position of anatomic rest is important because the motion of muscles spreads the infection.

In the diagnosis it must be considered that acute tenosynovitis differs from lymphangitis or acute cellulitis. The flexor tendons possess definite tendon sheaths, which run down into the palm in some cases, and in others stop at the base of the finger. We find the one of the thumb communicating with that of the little finger through expansions of the sheath called, respectively, the radial and ulnar bursae. The fact that often these patients have tried poultices for several days (late cases, referred cases) makes the diagnosis more difficult and lessens the chance of perfect function. The semiflexed position, the one of greater ease, the unwillingness to extend the hand, the tenderness sharply localized to the limits of the sheath, the swelling of the dorsum, are all important in the diagnosis.

The technique of operation is most important. General anesthesia, bloodless field, small retractors, good light, sharp scalpel, and patience are all required. Incise to the side of the midline, not cutting the flexion creases. Do not leave a drain over twenty-four hours, for adequate incision will secure adequate drainage. Mesh is the best drain; splinting, with a splint in a position of anatomic rest, is most important; bathe the hand in hot 0.5 per cent sodium citrate, boric acid or Dakin's solution every six hours for forty-eight hours, then 95 per cent alcohol to reduce



the bogginess; and finally dry dressings. Hot dry air is soothing and the electric light rays aid healing. It is important to prevent secondary infection, and when not immersed in the bath, the hand should be wrapped in a sterile towel. Early motion shortens convalescence and gives better results.

It is a good idea in all cases to soak the hand for an hour in Dakin's solution and then wrap it in a sterile towel before the patient is brought to the operating room. Mercurochrome 2 gms. in 35 c.c. distilled water, 55 c.c. 95 per cent alcohol and 10 c.c. acetone make a good skin disinfectant. The use of sterile stockinette instead of towels has proved very convenient to exclude the rest of the hand from the operative field, or putting on a rubber glove answers the same purpose. Tetanus antitoxin should always be given whenever the skin is broken and there is much contusion.

Infections of the radial and ulnar bursae usually are extensions from the thumb and little finger tendon sheath, respectively. We find an enlargement of the previous area of tenderness and greater swelling. We must bear in mind that this may come through the common flexor sheath, the radial bursa sometimes being secondary to the little finger sheath, and vice versa. The incision may be made along the tendon. Secondary hemorrhage from the radial artery may follow and this possibility must be borne in mind. If the infection extends to the forearm, Parona's space must be drained. Kanavel says: "Starting one and a half inches above the tip of the ulna, incise to its flexor surface. With a clamp, open the area just ventral to the flexor surface of the two bones and cut down on the point of the clamp on the radial side. Enlarge the skin openings for through-and-through drainage."

There remain for consideration two spaces, the thenar and middle palmar. These spaces are deep and lie between the flexor tendons and the metacarpal bones. They are difficult to visualize but

a careful study of Kanavel's book aids wonderfully. They are separated by the insertion of the adductor transversus muscle. The midpalmar space is an inverted truncated cone with the base toward the fingers. Infection in these spaces comes from the tendon sheaths or from puncture wounds. The signs are usually definite in the midpalmar space. There are loss of concavity of the palm and great swelling of the dorsum of the hand. The thenar space shows great swelling, limited by the anatomical shape. Treatment consists in incision, opening of these spaces with clamps, drainage and the usual postoperative care. Do not suture the incision. If it is long put in stitches but do not tie them until the third or fourth day. The incision for the thenar space should be made between the thumb and the index finger, and a clamp pushed down to the middle metacarpal bone. Opening of the midpalmar space may be effected between the fourth and fifth fingers and a clamp forced down underneath the tendons to the middle metacarpal bone.

### CONCLUSIONS

1. Infections of the hand challenge our most careful attention because of their number, and their importance in decreasing the earning power of the employee.
2. The smallest wounds may be the most disastrous.
3. Anatomical information, bloodless field, sharp scalpel, good light, patience and a general anesthesia are essentials.
4. Never forget tetanus antitoxin.

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### Discussion

DR. BROOKS W. MCCUEN: Dr. Le Seur has presented his splendid paper in a very clear, concise and logical manner. He took up first the anatomy, then the symptoms and diagnosis, and then the treatment.

Without a thorough knowledge of the anatomy of the hand you cannot interpret the symptoms and make an accurate diagnosis, and, if you cannot make an accurate diagnosis, the treatment is going to be of no avail.

Further, if you place these incisions outside of the bursa that is infected, then you do not get adequate drainage. If you do not get adequate drainage (and Dr. Le Seur called attention to that as being the keynote of the treatment) you will have disastrous results.

Many of us have seen such cases as this: A thickened hand, an infected hand, with an incision on the dorsum. The drainage is not adequate there; the infection is going on all the time. Because the infection is in the palmar sheath an incision on the back of the hand does not give adequate drainage and the infection will rapidly go up the tendon sheaths.

My idea is that in these infections, with the fingers involved first and then the hand, there is a throbbing, swollen abscess or an infected area. If you make an incision there you will relieve that pressure. Pus is discharged through the surface, and it gives nature a chance to do what it intended to do, that is, it will try to burst through, and the infection will subside. The infection decreases, and the glandular infections will then subside if you get them early, and that brings us to one other thing.

I think the responsibility in these hand infections, which are so numerous, as mentioned by Dr. Le Seur and yesterday by Dr. Moorhead, is that these workmen often have cuts and many of them come with an infection and when I say: "That needs to be opened," they will say: "I have had hundreds of these cuts and have never had an infection before." Frequently to these patients when they say

they have had cuts and punctured wounds many times before and never had an infection, I reply: "There are a great many people in the cemetery who were never there before." Then they stop to think: "Well, maybe this is an infection."

Dr. Le Seur emphasized a general anesthesia. This is certainly very important in all except the very minor types of infections. If you try to open an infected hand, which is very painful as you all know, with a local anesthetic, the minute the point of the knife touches, it increases the pressure, and gives more pain in spite of the fact that you may have tried to use ethyl chloride, or something else of that sort. The patient will pull away; you have made a very poor incision and you do not get (again the keynote) adequate drainage, and then you are going to get a disastrous result, because the patient will not submit to the second or third incision in the hand.

Again repeatedly I have had patients come to me with what I like to term "medical incisions." Someone has previously just put in a little cut, a stab wound and left it without wicking, or anything to allow the drainage to take place, and that infection is traveling right up the arm, involving other spaces.

I do not agree with Dr. Le Seur about drainage. Dr. Kanavel mentions the use of vaseline gauze, but I like to use iodoform gauze, as I think it is preferable to the plain gauze. I put some vaseline on; I put that drain well in; and I leave it longer than twenty-four or forty-eight hours. I like to let nature even force it out, because I like to have a wound open down to the seat of infection.

Dr. Le Seur advised rest of the infected part for a few days on a splint. I think that it is a very good thing to immobilize the part during the first few days of the acute infection. Immediately that there is adequate drainage down goes the swelling, the pain is relieved and the patient is better; then you can take the splint off and begin active and passive motion, because a good result is what you are after.

Recently the Vice-President of the New York Central Railroad sent out a bulletin intended for surgeons, foremen and others, to impress the importance of getting these patients back to work early, and immediately a man is injured, of sending him to the physician. That is what we want. We want to get our cases back to work early without any permanent disabilities.

If there is an infection of the hand, we all have to take note of it, because we have to face our own results before the Compensation Board or the Claim Department. If the employee has a crippled hand or the loss of function of one finger as a result of infection, you have to face that and you have to tell why it has happened.

If we begin motion early nearly all of these patients will say: "Wait, wait"; and if you leave it to them they will wait until the pain has left the hand and then it is too late. Adhesions have taken place in the tendons and the hand is stiff. My own idea is to begin early. I employ passive motion every day I see them, and I instruct the patient himself to move his fingers every hour of the day in order to prevent the adhesions.

Here is a case that is finished. Dr. Le Seur did not mention that, and I shall just say a word about it. On Friday or Saturday you say to a patient: "Go back to work on Monday." This patient is supposedly discharged and I mark him off to return to work on Monday. In two or three weeks the Motive Department or the Claim Agent will call up and ask, "Where's So-and-So?" I say: "He went back to work two or three weeks ago." They say: "No, he hasn't come back to work." I had lost sight of him and he is waiting until the pain has gone and the use of the finger comes back. I do not think that we as surgeons ought to

discharge those patients until they are back to work with good functional results. If possible I like to refer them then to physical therapy, and I do not wait until the wound has healed but send them early for this active and passive movement and massage. I think that those that are to be referred to physical therapy should be selected cases. Do not allow them to go to the physical therapist and forget all about them. If you do, it will be sometimes two or three months before you hear from them again, and they will still be out of work. You owe it to the patient and to the company and to yourself to see those patients in that interval every week or every two weeks, at any rate, until you get them back to work.

Dr. LE SEUR: I want to thank Dr. McCuen for his excellent discussion, which supplements the paper admirably. The one thing, perhaps, for us to remember (and he brought out the seriousness of these infections) is that these cases ought not be treated in the office. If there is any sign of the condition becoming more than a very superficial one, they should be sent to the hospital. We will save ourselves worry, the man pain and suffering and the company money, by doing that.

Another thing is the adequate incision. I believe if you make an incision long enough and deep enough you will not have to pack it to keep it open.



# TREATMENT OF NON-PENETRATING WOUNDS OF THE ABDOMEN\*

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THE treatment of non-penetrating wounds of the abdomen is so closely linked to the question of diagnosis that a proper consideration of the one must of necessity include, to a certain extent, a discussion of the other. In penetrating wounds of the abdomen, the indications for treatment are commonly quite obvious but in non-penetrating wounds the problem of diagnosis and treatment is usually perplexing. Moynihan in his recent work on *Abdominal Operations* makes this statement: "Any surgeon whose experience of hospital work is extensive will have realized the great difficulty that almost always exists in discriminating in the early stages between those cases of abdominal injury which are trivial, and those in which a laceration of the intestine has occurred." This statement is equally true when the question of injury to other abdominal viscera is under consideration. The greatest difficulty of diagnosis exists in the early stage which is obviously the optimum period for treatment.

In order to arrive at a proper diagnosis upon which treatment must be based, it is necessary to review carefully the history of the injury and note the subjective and objective symptoms. Primarily there are two kinds of blows to the abdomen; generally the type of injury depends upon the kind of blow. The first of these is a local injury as where the individual comes suddenly and forcibly in contact with some small sharp object such as the corner of a table. This type of injury commonly results in damage to the structures imme-

diately in the region of the point of injury. The other type of injury is the diffuse, such as is seen where the abdomen is run over. In this type, damage to the intra-abdominal organs usually occurs at the fixed points of the intestines or the vascular pedicles of the solid organs. Repeated and careful consideration of the symptoms is often essential to an accurate working diagnosis. The onset of new symptoms, the rise in the pulse rate, the change in the temperature, the increase or decrease of spasm of the abdominal muscles must all be carefully noted with frequent and painstaking study. Early diagnosis is of the greatest value in these cases for time is an exceedingly important element.

With these remarks on the difficulty of diagnosis in non-penetrating wounds of the abdomen I shall proceed to a general discussion of diagnosis and treatment which will be followed in turn by a discussion of the problem as applied to the individual organs. I shall not concern myself with the treatment of the complicating wounds of the abdominal wall, even though they be non-penetrating, for the reason that the method of treatment of such injuries is usually obvious. I shall include in this discussion injuries to the kidneys, which are in reality intra-abdominal organs. The extent of the damage to the contents of the abdomen may vary from simple contusion to severe laceration or rupture of an organ. Large vessels may be torn, segments of the intestinal canal may be completely separated or the tissues so damaged that secondary perforation or

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gangrene ensues. Commonly, injury is confined to one organ or to one segment of gut but multiple injuries are not at all rare.

Patients with serious abdominal injury commonly present symptoms of severe shock. The pulse is rapid and of small volume, the temperature is subnormal, there is a pinched expression on the face. Vomiting usually occurs soon after injury; it is persistent, and in cases of intestinal rupture is present almost without exception. With reaction from shock, an elevation of the temperature is to be anticipated. Localized acute tenderness over the injured structure is usual before the spread of peritoneal irritation. Spasm and rigidity of the abdominal muscles appear quite promptly and do not yield to morphine. In the later stages abdominal distention takes place. Free fluid, which may be blood, feces or peritoneal exudate may be discovered in the flanks. It is frequently necessary to make repeated examinations in these cases in order to arrive at a satisfactory diagnosis. In some instances it is impossible to make such a diagnosis and after a reasonable attempt has been made, operation should be performed without further delay.

Treatment in these cases is first directed to combating the condition of shock. Heat, morphia and rest are important temporary measures. If not incompatible with the condition of shock, a modified Fowler position is desirable for obvious reasons. Fluids, as they can not be given by mouth, must be administered by rectum, subcutaneously or intravenously. Ordinarily warm saline solution is probably the most satisfactory fluid to use. In the cases that exhibit more profound shock, the use of glucose and insulin is indicated. Glucose is supplied in handy, sterilized ampoules each of which contains 10 grams in 20 c.c. of solution. This may be given intravenously without dilution or, if greater fluid volume is desired, it may be given in saline solution. It is wise to limit the total volume of intravenous solution to 500 c.c. and this quantity must be given slowly,

otherwise cardiac dilatation may be induced. Insulin, 1 unit to 3 grams of glucose, is given in the usual manner to burn up the glucose. Half of the required dosage of insulin should be administered just after starting the intravenous injection and the remainder at the end of the process. In the more serious cases, transfusion of whole or citrated blood is an exceedingly valuable procedure.

As previously noted, diagnosis is difficult. The safest rule to follow is to operate if in doubt, except in cases of suspected kidney injury. The persistence of vomiting and a rising pulse rate are sufficient to demand exploration. It is better to perform an occasional unnecessary exploration with little risk to the patient than to delay operation in that case where it is urgently needed. The majority of these cases stand surgery quite well after they have reacted from the state of shock. If after observation for two hours, the general condition of the patient has not improved and symptoms of internal hemorrhage are present, laparotomy should be performed in spite of the presence of shock. The type of operation will depend upon the extent of the damage and the condition of the patient. Speed is essential but is secondary to safety. Mere packing of a lacerated liver or kidney may be all that we dare do; if the damage is to the intestinal tract, perhaps resection and enterostomy rather than anastomosis may be advisable. In other words we must proportion the shock of the proposed surgical procedure to the estimated strength of the individual patient, for a live patient who will require secondary operation is better than a dead one who has had too much. The usefulness of the omentum as a tampon to secure hemostasis or to reinforce suture lines is not to be forgotten. When the injury to a solid organ has resulted in considerable hemorrhage, it is wise to leave the blood within the abdomen so that it can be absorbed. When operation is delayed for twenty-four to forty-eight hours and there is evidence of abdominal hemorrhage, one must pro-

ceed with considerable caution as the sudden relief of intra-abdominal pressure, resulting from incision, is very likely to start up brisk and oftentimes fatal hemorrhage. Following operation in these cases, treatment will depend largely upon the extent of the injury and the reaction of the patient. The same measures advocated for use before operation are of value after operation especially in the replacement of fluid loss.

*Injuries to the stomach* are rather uncommon due to its protection by the costal arch and because of its relatively thick walls. The only type of injury which justifies consideration is rupture of the stomach. The symptoms are those of serious injury to any abdominal viscus. Pain is very severe and localized. Vomiting is frequent and occasionally the vomitus contains blood. Collapse comes on very promptly after rupture of the stomach, especially if the tear is of sufficient size and the stomach contained much food. Immediate operation is indicated where rupture of the stomach is suspected. Suture of the laceration should be by double layer of inverting stitches. If the laceration is near the pylorus care must be taken in placing the sutures to avoid narrowing of the lumen which will occur with the healing. Reinforcement of the suture line with a tag of omentum is a useful method of preventing leakage. If there has been only slight contamination of the peritoneum closure without drainage is safe. Otherwise drainage is indicated. In those cases where extensive contamination has taken place, drainage of the pelvis through stab wounds is necessary in addition to local drainage. Postoperative treatment is similar to that used in any case of gastric surgery in which the danger of peritonitis is anticipated.

*Injuries to the intestines* are of varied types. The gut may be crushed; it may be ruptured; it may be torn at a fixed point; it may be so damaged that secondary perforation results; gangrene may ensue because of injury to the mesentery. The

ileum is more commonly injured than any other portion of the intestinal tract. The symptoms of serious intestinal injury at first are those of shock. Persistent vomiting is a most important sign as it is present almost without exception in cases of intestinal rupture. Rigidity and muscle spasm are marked. In a few hours abdominal distention appears and free fluid may be discovered. It is well to remember that in injuries to the jejunum, symptoms are frequently delayed for hours. In the treatment of these cases of serious injury to the intestine, speed is one of the essentials. Operation within six hours following injury gives the best results. It is wise to wait until primary shock is over before operating. One of the chief dangers in operations of this nature is from prolonged evisceration, which is to be avoided. Warm towels must be freely used to protect the exposed intestine from undue chilling. In locating the lesion we search for lymph exudate, blood or feces as our guide. It may be necessary to examine methodically the entire length of intestine. Simple suture of the tear in the gut may suffice if it is small and single. A double inverting suture, reinforced by omentum, makes a satisfactory closure. In other cases where the laceration is too extensive or gangrene is imminent because of interference with the circulation, resection and anastomosis may be necessary. In these cases where the condition of the patient will not warrant anastomosis, the damaged loop of gut may be brought out of the abdomen as is done in performing operations for malignant growths. In those cases in which anastomosis is done, it is wise to perform an enterostomy above the site of anastomosis, which will serve as a safety valve. Before closing the abdominal incision, the peritoneum is sponged carefully to remove all foreign material. Drainage is usually desirable in all of these cases. The cigarette drain is the safest type from the standpoint of injury to the intestinal wall and will suffice in most cases. The drain should be removed as soon as safety will allow for

we all appreciate the damage resulting from prolonged irritation of a drain. Usually forty-eight to seventy-two hours are a sufficiently long period to leave the drain. Postoperative treatment is similar to that for other cases of intestinal surgery.

Serious *injuries to the liver* are generally in the nature of lacerations or so-called fractures. The common site of the fissure in cases of rupture of the liver is along the falciform or coronary ligaments. Hemorrhage varies with the severity of the lesion. In serious injuries hemorrhage may be rapidly fatal. The symptoms of serious liver injury are those of shock, localized pain and tenderness with signs of hemorrhage. Free fluid in the abdomen is a very important sign especially when associated with increasing pallor and a rising pulse rate. Treatment consists of controlling the hemorrhage and repair of the laceration. Upon opening the abdomen in these cases smart bleeding may result from the decrease in intra-abdominal pressure. In some instances control of hemorrhage can be accomplished only by tamponing with gauze; in others the omentum may be used as a natural tampon. Bleeding points are clamped and ligated if possible. Suture of the friable liver can be accomplished by carefully using blunt needles and large sized suture material. The use of drainage depends upon the amount of uncontrolled oozing and the presence of free bile. Postoperative treatment is similar to that for any other serious intra-abdominal injury.

*Injuries to the spleen* are somewhat like injuries to the liver. Tears are generally in the direction of the blood vessels. Even small tears may occasionally give rise to fatal hemorrhage. The symptoms are those of abdominal injury, i.e., shock, pallor, rising pulse rate, etc. The location of the injury and the site of the pain are often very helpful in making the diagnosis. In some injuries all that is needed is suture of the laceration; in others packing may be necessary; in the most serious type splenectomy is indicated. Drainage of the abdomen is not required, as a rule.

*Injuries to the pancreas* are serious because of the liberation into the abdominal cavity of pancreatic juice. With the occurrence of this, marked peritoneal irritation is evident. There are no special symptoms of pancreatic injury except the rapidity of onset and spread of peritoneal irritation which occurs when there is laceration of the organ. Complete rupture of the pancreas does occur. The duct of Wirsung is occasionally torn. Before any investigation of the extent of the damage to the pancreas is begun, it is absolutely essential to wall off the rest of the abdomen with tampons. Any free blood or pancreatic juice must be wiped up at once. The best approach to the pancreas is probably through the gastrohepatic omentum. In repairing a laceration of the pancreas, deep sutures through the body will usually hold. Suture of the duct should be attempted if it is torn. Resection of the tail of the pancreas may be necessary where the organ is seriously damaged. Drainage is essential in all cases of pancreatic injury.

*Injuries to the kidney* vary in severity from simple contusion to actual rupture. Shock follows these injuries. The cardinal symptoms of serious kidney injury are hematuria, diminished excretion of urine, pain localized in the kidney region and a tumor mass in the loin. The shock must be treated along lines similar to the methods advocated in other cases presenting shock. Catheterization of the bladder is a dangerous procedure in this condition because of the likelihood of infection, for infection of even a slightly damaged kidney may make nephrectomy necessary. Operative treatment should be conservative as fatal hemorrhage can probably not occur unless the renal artery or vein is torn. Immediate operation should be performed if the patient fails to react from shock. The common indication for operation is an enlarging tumor in the loin. The persistence of anuria for twenty-four hours is another indication. Later, signs of beginning sepsis make operative intervention necessary. The type of operation will



depend largely upon the severity of the injury. In most instances simple suture, with or without packing, is all that is required. Speed in operating is essential but safety must not be sacrificed to it. Rarely is primary nephrectomy indicated in these cases and its performance, increasing the already existing shock, is often fatal. Later, nephrectomy may be necessary because of prolonged bleeding or the appearance of sepsis.

*Injuries to the bladder*, except rupture, rarely demand surgical intervention. Rupture of the bladder may occur from external violence or spontaneously. Rupture or laceration of the bladder is most commonly the result of a fracture of the pelvis. The rupture may be extraperitoneal or intraperitoneal. The latter is the more common type. The extraperitoneal rupture results in a cellulitis while the intraperitoneal rupture causes peritonitis. Patients with a rupture of the bladder commonly give a history of a sensation of feeling something tear at the time of injury. They have frequent desire to micturate and attempts to do so result in the expression of a small amount of bloody urine or no urine at all. Too much reliance must not be placed upon the test of injecting water into the bladder for, in a few instances, recovery of the total volume is reported. In cases where serious injury to the bladder is suspected, immediate operation should be performed. If the rupture is thought to be intraperitoneal, the peritoneum is opened and explored. The laceration is inverted and sutured in two layers, the peritoneum is cleansed and the abdomen is closed with drainage. If no intraperitoneal rupture is found and there is still suspicion of a rupture of the bladder, the incision is closed and the bladder is opened extraperitoneally through another incision. If a tear is found in the bladder mucosa, it is repaired from within. In either type of rupture of the bladder it is always wise to protect the suture line after operation by the use of a retaining catheter.

It is not generally recognized that a true *traumatic ileus* can follow abdominal injuries.

Recently I cared for a patient who had fallen a considerable distance and sustained a fracture of the skull and hip and a contusion of the abdomen. Within twenty-four hours from the time of injury, abdominal distention was noted. This progressed rapidly and vomiting soon appeared. The vomitus became fecal in character. Enemata of all kinds, pituitrin and eserine were ineffectual. Repeated gastric lavage afforded no relief. Twelve hours after the onset of these symptoms, jejunostomy was done. This was followed by slight improvement but, within thirty-six hours from the time of operation, the patient expired. Post-mortem examination revealed a generalized distention of large and small intestine without any other sign of injury to the abdominal viscera. The injuries to the head and hip were not of sufficient severity to have caused death. From the condition found at the autopsy, it is obvious that this patient died of a generalized intestinal atony and that a single enterostomy could have done little good. Perhaps multiple enterostomies would have drained sufficient of the gut and resulted in recovery.

A condition encountered in another case is worthy of brief mention here. A boy, aged twelve, after a fall of about 30 feet, was admitted to hospital with a concussion of the brain, multiple bruises and abrasions and a fracture of one of the fingers. After admission the pulse rate rose rapidly, the symptoms of shock increased and progressive rigidity of the abdomen was noted. Vomiting was persistent. The boy remained in coma so we were unable to have the advantage of any subjective symptoms. After observation over a period of six hours with no improvement, exploration of the abdomen was performed. Extensive *subperitoneal hemorrhages* were found. The intestinal serosa was dotted with hemorrhagic areas; the retroperitoneal tissues were almost black with extravasated blood. Realizing that surgical treatment offered little, the abdomen was closed and general treatment for hemorrhage and shock was instituted. The boy made a satisfactory recovery. This case illustrates the difficulty of diagnosis in abdominal injuries.



## CONCLUSIONS

1. The diagnosis of serious injury in cases of non-penetrating wounds of the abdomen is frequently difficult.

2. A rising pulse rate and persistent vomiting are sufficient signs to justify exploration.

3. Prompt exploration should be performed in all suspicious cases except in kidney injuries.

*Discussion*

DR. LE SEUR assumed the Chair.

DR. BRADLEY COLEY: I think this is one of the most interesting and most helpful papers we have had at any meeting I have attended. It is very interesting to me because at Bellevue Hospital we get these traumatic abdominal cases not infrequently, and they tax our ingenuity and our judgment more than any other cases we have, I think. I should like to cite briefly a few cases that bring that out, and expand a little bit on some of the points Dr. Dickinson brought out.

About two months ago I was called to Bellevue to see a man who was admitted shortly before with a history of having fallen about 6 feet and having struck his left lower costal margin against a beam. He came in a wheel chair, and as it was a non-urgent case he was put to bed and examined. It was noted that his general condition grew rapidly worse; that he was pallid, cold, obviously in shock; the pulse rate was climbing and he developed a general abdominal rigidity. The bullae that were seen on his skin over the lower ribs on the left side suggested to us at once the possibility of a ruptured spleen. Through a left rectus incision we found a tear through the substance of, and extending two-thirds of the distance across the spleen, and involving a splenunculus. A splenectomy was done; and I call attention to this feature: The man had approximately a quart of blood in his belly cavity. We had read of the maneuver of autotransfusion and we had been waiting for a suitable case to try it. With a small sterile cup that was used for novocaine we bailed blood out of this man's belly into a basin. We succeeded in recovering in that manner over 700 c.c. of blood, to which we added all the blood we could squeeze out of the laparotomy pads, and we gave him a transfusion of over 700 c.c. of his own blood. We called a couple of internes to do this while we

were operating. By the time the splenic pedicle was tied he was beginning to get his blood and the transfusion was continued while we sewed up his abdomen. The man made an uneventful recovery, though his condition was so precarious I feared for a time that we would lose him on the table. I feel convinced that his recovery, if not entirely dependent upon this transfusion, was largely aided by it. We gave him another transfusion from a donor, within a few hours, but I doubt whether without the autotransfusion he would have stood the strain until we could get a donor for a regular transfusion. I commend this maneuver when you meet a similar case of any severe bleeding of the abdomen.

Dr. Dickinson spoke of ruptures of the liver. I have had 2 such cases to operate upon. A stranger in town jumped off a surface car while it was going, struck an elevated pillar and had a severe laceration of the right lobe of the liver. The operation was simply an exploration and packing of the wound, which is about all one can do with a severe liver injury. That patient died. The other case was of a young girl run over by a truck. Her abdomen was traversed by the truck wheel. She had an even more severe laceration of the liver and was treated the same way. The outcome in her case was fatal also.

These liver wounds are obviously not suitable for suturing, as a general rule, for the sutures are prone to tear out of the liver. I think that tight packing and autotransfusion might save some of these cases. Very often they die before one can get things going for transfusion from a donor.

I had another case that puzzled me. It was very much like the one Dr. Dickinson cited. This man had been struck by two packing cases, in the lower abdomen. He was admitted to the hospital where I saw him at 7 o'clock at night. He had been seen in the afternoon by one of my colleagues who thought operation was not indicated. When I saw him he had obviously a severe contusion of the abdomen but it did not seem to need operation at that time. Seen again at 11 P.M. I found he had passed pure blood from his urethra. I called upon the genito-urinary service to give us some help. They cystoscoped the man, but could see no tear. They suggested filling his bladder with boric acid solution. That is one means they have of determining a bladder rupture. This seemed to me to be contraindicated because the man had

an active urethritis; so I decided to operate at once. I discovered a hematoma as large as a paneake and of the same general shape and size, and about an inch thick. It extended down to the retroperitoneal portion of the bladder and filled the triangular space posterior to the bladder, but I found no evidence of an actual separation or tear of the bladder wall. It seemed to me at the time that to incise on this hematoma and to turn it out would be dangerous, for the reason that it would convert a sealed off hemorrhage, which was obviously being tamponed by nature, into an open intraperitoneal bleeding, and very likely we would not be able to locate the point of bleeding. Therefore I closed the abdomen without drainage, and the man made an uneventful recovery. He developed a postoperative hernia. I repaired this hernia about 3 months later and at that time I had an opportunity to explore his abdomen. The hematoma had been entirely absorbed and the abdomen was practically negative.

I make one plea (I think Dr. Dickinson has brought this out already) any puncture or bullet wound of the abdomen should be explored, no matter how trivial. We have seen cases where it seemed almost certain that the peritoneum had not been opened, and on exploring we found extensive damage to solid or hollow viscera. We have also seen a case where the bullet wound of entrance was in the thorax with no wound of exit, and the patient was suffering chiefly from abdominal symptoms, and the bullet was found on laparotomy to have passed down into and severed the colon. These things we cannot find out without exploring. I have seen stab wounds where the thing looked shallow and superficial and, on exploring, the omentum was found just under the skin, and in one case a liver was punctured. In all these cases the tract should be explored most carefully in the operating room or we will get into serious difficulties.

DR. BAKER: About two weeks ago a man was brought into the hospital at about 11:30 one morning, with the history of having endeavored to start a gas speeder with his helper; he stumbled and fell forward on his face. He had absolutely no signs of any trauma on the abdomen or chest. He had a pulse rate of 60, which did not go higher than 80 until about 9 o'clock at night, I saw him at 11:30 that night and at that time his pulse was 96, and his temperature was normal. At half-past ten he had vomited a little watery fluid. Those

were the only signs, with the exception of one, a very marked spasm of the abdominal muscles, that were present from his entrance into the hospital.

At half-past one in the morning the hospital called me and said that the man was in shock and probably would not live until I reached him. On my arrival his pulse was almost imperceptible, and it was determined then to use intravenous saline infusion and endeavor to explore the abdomen. We found that the jejunum was torn almost completely in two. There was absolutely no blood in the abdominal cavity but there was a large amount of intestinal contents. He stood the operation very well. A cigarette drain was placed in the pelvis, after closing the rent in the jejunum. Less than twelve hours later he died. My thought is that in the absence of hemorrhage, which would give an indication of circulatory disturbance, the presence of severe and persistent rigidity of the abdominal muscles, even without other traumatic symptoms, is sufficient indication for an exploratory incision. Since then the thought has come to me that the most important evidence of rupture of stomach or bowel is the determination of pneumoperitoneum, as very definitely and very early shown by roentgenography.

DR. LEE: One very important thing in these cases is to determine whether a condition of great depression is due to shock or to concealed hemorrhage. When the diagnosis is made, the treatment is indicated, and an exploratory operation, simple in itself, reveals all that we can possibly know. I saw two prize fighters who died, one thirty-six hours after he was hit in the kidney (from rupture of that organ and slow hemorrhage) and the other from rupture of the colon (a very rare condition).

There is a good deal I could state, but these are conditions that we have got to study, and we have got to formulate our rules so that we will know promptly whether the depression is due to shock or to hemorrhage. To one thing we must make up our minds, that is, whether we make a mistake or not, to get into those abdomens as early as we possibly can.

DR. BALL: I had a case that falls into this group. It was in a boy who was speeding in an automobile. He took a bank and went over, and was sent in some 20 miles by car. When he came into the hospital, he had a very tense, thready pulse and there was no doubt that he had some intra-abdominal trouble. I was not

certain what it was but we operated immediately, and we found that he had at least a 3 inch fracture of the lower part of the right lobe of the liver. After getting the blood out of the liver wound, which I first felt with my fingers, I packed it very tight, and instead of bringing the drain out anteriorly I brought it out in the right flank, and then kept the boy on his right side. We got ready immediately after the operation for a transfusion, but the patient did not need it. He made an uneventful recovery.

DR. O'NEILL: It has happened to me that I have had to deal with a number of perforations, not only from trauma (in fact, the greater number were not from trauma), and I think that there is one observation especially that may be made, and that is that general rigidity, without reference to other symptoms, is a fair indication for laparotomy. If we operate in every case with general rigidity, we will be playing a much safer game. I have had 16 perforation cases brought to me in time to save every one of them. I do not mean that is all I have seen, but those were consecutive cases, and in each one of them there was rigidity.

Dr. Dickinson mentions cases where there was not that sign. Then, of course, one's judgment is on other issues.

I recently saw a man who fell from a ladder and struck his abdomen against a heavy metal table. He had just that kind of tenderness you sometimes see in early appendicitis when the rest of the abdomen is flaccid. I did not open him; he did not develop the chain of symptoms that would lead to general rigidity, and he got well; but I see very readily from cases that have been mentioned that that might have gone on; it might have been a localized hemorrhage that might have led to a subserous blood clot that could have broken and maybe put him beyond help later. However, he was a very bad risk; he was over sixty and had a goiter and a kidney condition, and I took that also into consideration.

I believe that if we operate in every case

with a rigid abdomen it will save us a great deal more often than it will get us into trouble.

DR. DICKINSON: I am glad Dr. Bradley Coley brought up the question of autotransfusion. I think that is very important in some instances. Of course, we do not always have facilities at hand for pumping the blood which is found in the peritoneal cavity into vessels, and in those instances perhaps it would be a wise precaution to leave it in the abdomen.

Dr. Baker cited a case of rupture of the jejunum. If you recall in my paper I stated that very frequently in injuries to the jejunum, the onset of symptoms is delayed for twenty-four hours. His suggestion in regard to the use of the roentgen ray to determine the presence of pneumoperitoneum, I think is a very valuable one, because it will certainly show if there has been a rupture anywhere along the gastrointestinal tract with the escape of gas.

Dr. O'Neill emphasized generalized rigidity of the abdomen. I think that is very important from a diagnostic point. There is only one thing I have to say in regard to it, however, and that is that sometimes we are a little bit thrown off our guard in these cases, which may or may not be traumatic.

Quite recently I had the experience of operating upon a man who had a gastroenterostomy. He was brought into the hospital with what I considered a general abdominal rigidity, nausea, vomiting of blood, and a rising pulse rate, and in view of his physical findings I made a diagnosis of a perforation of his ulcer. I performed immediate laparotomy and found no perforation of the ulcer, but I did find a partial obstruction, due to multiple adhesions within the abdomen.

DR. LE SEUR (Chairman): Just one thought along this same line. Someone said that it is better to look and see than to wait and see. I think that, perhaps, sums up the situation pretty well. Then another saying is that if your first incision is not in the right place, it is not in vain because it shows the necessity for a second incision and where it should be placed.



# PRINCIPLES OF THE FOURTH ERA IN SURGERY\*

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DR. Thomas L. Bennett, the anesthesiologist who has probably had as large an experience with different surgeons as any man of his special calling, remarked to me one day that the best surgeon is the one who acts all the while when operating as though he were afraid of waking the patient up. That will be my text.

The history of surgery may be classified rather distinctly in four categories or eras.

The first or Heroic Era: A rather surprising amount of surgery was done for centuries by men who knew little of anatomy or of physiology. Even the operations of cesarean section, of trephining and of opening the bladder for stone date far back. In native African tribes today cesarean section is done under palm wine intoxication in the place of anesthesia and the same wine is used for a wound dressing. Empirical knowledge of antiseptics during the first era related to the use of alcohols and balsams before the nature of their action was known. Surgery was heroic in the days of Hippocrates, who liberated medicine from religion.

The second or Anatomical Era, anticipated by Vesalius, made slow progress because of prejudice until the days of John Hunter and then rapidly developed into the proportions of a distinct era. Students of medicine were obliged to develop a more comprehensive and refined knowledge of anatomy during that era than at any time previously or, I regret to say, since. A somewhat similar history belongs to art. There was finer drawing and perspective before the advent of the impressionist or futurist schools than there is today. At the height of the Anatomical Era it

was believed that surgery had reached its limitations and Baron Larrey, Napoleon's surgeon, said that it could go no further; all that could be known about surgery was already known; the only thing left for the student of the future was to acquire what was already known and to perfect his technique.

Then came the third or Pathological Era. There was explosive advance in surgery which made a revolution of the first magnitude. It was introduced by the practical work of Lister based upon the experimental work of Pasteur. Knowledge of life history of the microbe allowed surgeons to work with such a degree of safety that many who were ill-qualified to use a knife assumed responsibilities for which they were in no way prepared by judgment, experience or learning. This was one of the vices of the third era of surgery that accompanied its virtues. Dr. Maurice H. Richardson said that it was a pity that so many patients lived after operations by men who were incompetent as real surgeons. Another vice going with the virtues of third era surgery related to the length of time which men gave to any given operation deliberately. There was too much handling of viscera and tissue without regard to false motions, each one of which unnecessarily sent a destructive impulse to the centers of consciousness of the patient even though he were anesthetized. Long incisions and disregard of the elements which are known to introduce shock were features of the third era. Surgeons forgot what they knew about values of the sense of touch and began to work more and more by the sense of sight. The basic idea in this Era related to removal of microbes and their by-prod-

\* Read at the thirty-sixth annual meeting of the New York and New England Association of Railway Surgeons, New York, October 23, 1926.

ucts without knowledge of or at least due regard for natural protective forces belonging to the individual. Destruction of microbes became developed along lines of high art but left the patient himself out. He was an unimportant and small object in the presence of the large microbe.

At the height of the third or Pathological Era many of us doubtless felt as did surgeons at the height of the second or Anatomical Era. We believed that surgery had at last really reached its limitations. Lo and behold! a wholly new era again began to surmount principles of the third era when Metchnikoff and Wright turned our thoughts toward phagocytes and opsonins.

The fourth or Physiological Era began to light up our horizon. The basic theory of the fourth or physiological era is conservation of the natural resistance of the patient, turning him over to his phagocytes and antibodies as quickly as we can do it—a period of brief anesthesia and the least degree of surgical battle that will suffice. Perhaps nothing will serve as an object lesson in this regard better than results in the surgical treatment of acute appendicitis.

During the first or Heroic Era appendicitis abscesses were opened when they pointed in the flank. The condition was known as "iliac passion." Many appendicitis patients recovered in those days after the simple opening of their abscesses. In the second or Anatomical Era of surgery these patients were still recovering at times, after either spontaneous or surgical opening of the abscess of iliac passion which had now become known as "iliac phlegmon." The fact that many appendicitis patients died under medical treatment or surgical treatment belonging to the first and second eras in surgery is of less interest than the fact that many of them recovered under medical or surgical treatment. How did they do that? They did it with their natural protective resources. That is the point. It is the point upon which the principles of the fourth or Physiological Era were developed.

With the advent of the third or Pathological Era in surgery when it was believed to be necessary to remove all bacteria and their by-products as far as possible the operative death rate in acute appendicitis surgery seems to have been greater than it was during the ignorance of the first era or the anatomical excellence in the second era.

How was it that surgeons trained in principles of the great third era were unable to manage appendicitis cases as well as they were managed in earlier days when surgeons did not know about microbes? When pondering over this paradox it suddenly occurred to surgeons that it might be well to develop the principles of a fourth era, one in which the natural resistance of the patient was conserved as it had been done by doctors of olden times. There must have been something in their ancient ideas after all!

At the time when development of the fourth or physiological era was newly under way appendicitis cases with abscesses and widespread infection were making bad showing under the great third era principles, which aimed at destruction of the microbe only. Dr. L. W. Hottelkiss was then at work in the J. Hood Wright Hospital, New York, where the average death rate in acute appendicitis surgery had been 31 per cent. He suddenly decided to accept our teaching of principles of the fourth era of surgery and then had a run of 76 patients without a death in the very same class of cases in which the death rate had previously been 31 per cent. Could anything be more impressive? Yet when this object lesson and similar ones had been quoted to a certain conservative surgeon he remarked, "I don't care anything about statistics, we must stick to principles." He continued to have a high death rate in his own operative work in acute appendicitis.

Principles of the fourth era really date back to the idea held by surgeons of the middle of the last century empirically. They were calling attention to the desirability of rapid but not hurried operation. They impressed the idea that patients

recovered more quickly when the attack of surgery had been acute. Chronic operating was deadly in its nature.

Among ancient writers there is no reference to rapid operating but it was doubtless done on the score of avoiding hemorrhage rather than on the score of avoiding shock. The old Romans made no reference to rapid operating. Celsus is the first writer on that point. He was opposed to rapid work, however, saying that the surgeon must not have compassion which will lead him to hurry. We must always remember that distinction is to be made between safe and unsafe rapidity.

In the sixteenth century Ambroise Paré favors a speedy operation but Heister in the next century goes back to the position of Celsus in a way. He states that the operator should use expedition but not hurry. Most of us will agree to that.

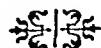
When we get to the English school of the anatomical era, Sir Astley Cooper does not mention rapidity of operating but concentrates attention upon knowledge of anatomy. Sir Robert Liston speaks in praise of dexterity and boldness without referring to rapidity. Bell, Lizars and other contemporary writers did not go into the matter of qualifications aside from knowledge of anatomy. Velpeau does not refer to time-saving except in the presence of syncope. Skey was one of the first to awake to the idea that the new resource of anesthesia might lead to shock because of duration of operations under the new method. "The duration of an operation may exceed the endurance of the patient," said he.

In 1772 Morand of Paris called attention to the fact that the old adage "*tuto, cito et jucundo*" applied to surgery quite as well as to medicine. Bardeleben one hundred years later expressed the same

idea. He said, in addition, "safety is the first consideration but rapidity is a goal to be aimed at and is sometimes indispensable." Many of us remember this white-haired old surgeon and his deft manipulations at a time when no other Berlin surgeon excepting Israel appeared to care about the patient himself.

Treves in his somewhat prejudiced viewpoint in 1892 conceives of the rapid operator in the light of a player to the gallery. He gives such an operator no credit at all for trying to conserve the patient's vital energy. One gets the impression that Treves was aiming a parable at the head of some one colleague whom he had in mind, Tait, perhaps. Tait sneered at antiseptic or aseptic surgery at a time when it was close to our hearts. He presented better statistics in abdominal surgery than were presented by any other surgeon of his day who was following Listerian principles. Tait was a speedy operator through small incisions, working lightly by the sense of touch. He really did play to the gallery a bit but with a sense of humor that seemed to be directed toward Treves. Tait was depending upon the patient's natural powers of resistance which were not shocked and put out of commission. He did not know just how to state the matter in terms of physiology but called it "horse sense." Tait was a thorn in our side at the height of the third or pathological era of surgery because we could not at that time explain the nature of his discomforting success. Now, in the fourth or physiological era of surgery we understand.

In the first and second eras of surgery man was bigger than the microbe. In the third era of surgery the microbe was bigger than the man. In the fourth era of surgery we return to the position that man is bigger than the microbe.



# RAILWAY ACCIDENTS AND THEIR COMPLICATIONS\*

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ALTHOUGH accidents occurring in the railway service cover almost the entire field of traumatic surgery, yet there are certain types of injuries that recur with surprising frequency. It is to this group, with their complications, that I shall confine my discussion.

Head injuries constitute a large percentage of wounds following the derailment of passenger coaches. Fracture of the skull and disfiguring lacerations about the face present problems that tax the surgeon's skill and ingenuity. Following a recent accident, occurring in Northern New England, 32 patients were admitted to one hospital, and of this number 10 were suffering with some form of head injury. Perhaps there is no field where skilful surgery is of such paramount importance as in facial injuries. It cannot be stressed with too much emphasis that conservatism in this area will be amply repaid by cosmetic results and by the grateful appreciation of the patient. Nature, if given a chance, will be of great assistance to the surgeon. Cases have been reported where ears have been almost entirely avulsed, and yet, when sutured in place, have entirely healed with little or no deformity.

A short time ago a young, unmarried woman entered a Vermont hospital with the lower end of her nose resting on her chin, as it dangled by two small pedicles of skin. She was immediately taken to the operating room and anesthetized, and the nose fragment was sutured in its original position. Fortunately, the wound healed by first intention. Six months later, when she returned to extend to her surgeon a personal invitation to her wedding, only a purple line marked the former separation.

Fracture of the skull, with or without compression, is not uncommon. This class of cases presents a serious problem, and all should be hospitalized. A fine degree of surgical sense is required in the treatment of the condition. Among the more striking results that may persist, even after operation for decompression are dizziness, headache, impaired vision and hearing, and localized paralyses.

Fractures of the vertebrae are of serious importance. In the vast majority of them laminectomy is necessary to remove pressure on the cord. The mortality in this group is extremely high, and even if the patient does get well the hospital stay and subsequent convalescence are quite prolonged.

Passing mention is made of fractures of the extremities, although they form a sizeable group of all serious railway accidents. Here is a field in railway and industrial surgery where failure on the part of the operator is of serious consequence to all concerned. The treatment of these types of fracture is coming to be more and more standardized, but it would be impossible, in a paper of this kind, to discuss it in detail.

Shock is a condition that demands immediate and effective measures. As soon as the patient arrives at the hospital every effort should be bent toward the restoration of the normal functions. All authorities agree that heat and the administration of liquids are the two best methods now at hand. Perhaps there is no place where transfusion of blood produces such brilliant results as in shock caused by sudden hemorrhage. This has been clearly demonstrated in accidental amputations

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where the patient loses considerable blood before reaching surgical assistance. Although it is safer to type the recipient and to have both donor and recipient in the same group, one should not wait for this when it is a question of life or death. A member of Group IV (universal donor) should then be utilized, and from 400 to 600 c.c. of blood transfused at once. Clinical findings later determine the necessity of subsequent transfusions.

In any disaster failure to provide the press with a complete and accurate list of the dead and injured, at the earliest possible time, is a non-medical complication which immediately brings forth a storm of adverse criticism. While the hospital staff concerns itself with the surgical work at hand, it is the duty of the surgeon in charge to complete a survey of the patients entrusted to his care. The list should include the patient's full name, his address, occupation and the nature of the injury sustained. While this extrasurgical activity may seem of no importance, yet experience has demonstrated that it is the quickest way to get information to relatives and friends who are anxiously awaiting news.

Of the every-day accidents, foreign bodies in the eye are about as frequent a cause of office consultation as the railway surgeon has. This is particularly true of the men who are working in the shops, and also of train crews. In the former, bits of steel are not uncommon, while in the latter cinders are the usual offenders. The sites of lodgment are underneath the upper lid and within the cornea. Most of these foreign bodies, when removed, cause no further trouble, but occasionally an ulcer of the cornea develops. This may result in impaired vision if it is at all deep.

The individual who consults a doctor for an injured hand is entitled to the highest degree of diagnostic skill and surgical ability. Many surgeons lose sight of the fact that the working man's hands are the sole means of maintaining him and his family in the economic sun. The earning

capacity of the average working man is directly proportional to the functional activity of his hands. In their desire to obtain cosmetic results, operators are prone to wantonly sacrifice fractional portions of fingers. The practice should be heartily condemned, as Nature, if the opportunity be given, will restore this damaged tissue with healthy granulations.

The infected hand is another problem of serious concern to the surgeon because of its possibilities. No attempt will be made to discuss the condition as the program offers a paper on this subject.

Burns do not constitute a high percentage of railway accidents but are important. Engineers, firemen and hostlers are subject to the hazards of live steam and often seek treatment for burns of the exposed parts of the body. The multiple uses of gasoline and electricity result in numerous burns. For small, superficial burns, over a limited area, the use of wet dressings has proven successful. However, where there is any considerable amount of burned surface, wax sprayed over the damaged tissue, after the blebs have been opened and dead tissue carefully removed, has proven a decided advantage over other methods. The dressings are changed daily, wax being freshly applied each time. In determining the prognosis of patients suffering with severe burns, it is a well-known fact that the extent of the body area involved, and not the depth of the burn, is the deciding factor. Cases in which more than 50 per cent of the surface area is burned, as a rule, have a fatal termination, the body being overwhelmed by toxemia.

Surgeons living in the northern tier of states are confronted with the problem of exposure when accidents occur in the winter months. Several years ago a Pullman sleeping coach was derailed and became partly submerged in the icy waters of Lake Champlain. Although it was 25° below zero a few frost-bitten extremities, and some "colds" were the extent of the disabilities. Fortunately, few pneumonias develop, although the possibility of such a



complication gives the surgeon much cause for worry after this kind of an accident. The usual routine carried out in an accident at this time is the rapid evacuation of patients to the nearest hospital. Again resort is made to the utilization of heat and the administration of hot liquids.

Open wounds about the body are of frequent occurrence. Their treatment consists in the mechanical cleansing of the parts, the application of iodine or mercurochrome and the use of Dakin's solution. Sometimes it is impossible to obtain the regular Dakin solution, but the application of a simple, boric acid wet dressing will tide over the emergency. Eusol, consisting of an ounce each of boric acid and chlorinated lime to the gallon of sterile water, is an English formula developed during the War. Its use and action are similar to that of Dakin's solution, although the latter is by far the better preparation as the caustic alkalies have been removed.

The prophylactic use of tetanus antitoxin, as a routine measure, has almost entirely done away with lockjaw. As prepared by most pharmaceutical houses, 1500 units is the usual preventive dose. If, however, the infection does develop, the combined intraspinal and intravenous administration of large doses of the antitoxin offers the best chance of saving the patient's life. In order to reduce to a minimum the danger of anaphylactic reaction, all the tetanus antitoxin should be given within nine days after the onset of symptoms.

The Workmen's Compensation statutes enacted by the various state legislatures have greatly reduced litigation between the railroads and their employees. However, in accidents where passengers are involved, medicolegal complications almost invariably arise. Those concerning injuries of a minor character can usually be disposed of without difficulty. Cases that require hospitalization come under a different classification. On some roads a decided effort is made to impress the patient that there is no connection between the surgical staff and the claims department. The

majority of the roads have never established any definite policy along this line.

Personal observation has proven to my satisfaction at least, that the surgeon in immediate charge of the case may be the means of avoiding unnecessary and expensive lawsuits. Contact between the patient and a representative of the Claims Department, sometimes prior to his hospital discharges, impresses the injured person with the fact that the railroad is interested in his case. A friendly word of advice or the arbitration of a dispute over a few hundred dollars difference between the patients' claim and the railroad's offer is oftentimes the surgeon's opportunity to effect a signed release in an otherwise troublesome case.

### Discussion

DR. J. P. G. CUMMINS: In regard to shock I think we are all agreed that the sooner the patient is gotten into a warm bed and warm blankets, given hot coffee, hypodermatoclysis, blood transfusion, etc., the better; and we should not lose sight of the fact that an early dose of morphine aids very materially in transportation and lessens the blow given to the tissues.

In regard to hands, all of us who were at Dr. Moorhead's clinic yesterday, I am sure, will remember it as long as we live. We have all had trouble in getting an extension of the terminal phalanx, for which he gave us a very practical suggestion, traction by a linen suture passed through the end of the finger nail and back over the end of a miniature Thomas splint, made with your pliers and a little wire out of your automobile.

In dressing injured fingers, especially the finger that is clipped off with the terminal phalanx or any other portion of it, instead of sacrificing more bone to get flaps, I have for many years been using strips of adhesive plaster, not put on in shingle fashion but in lattice work. In using the adhesive sterilize it immediately. Put on a little pledget of cotton; moisten it with alcohol or, in the absence of alcohol, with spirits of camphor; sterilize the adhesive strips and put them on. There are two reasons for this procedure: one is that that stump will grow out and cover over the bone

and the other is that the dressings are painless. You also save time by it. It is very disconcerting in some of these compensation cases for the patient to see his friends receive a good verdict from the referee for damages, while his finger appears to grow and does actually grow.

Dr. McSweeney spoke of injuries to the face, including the ears. I recall a lady who was caught in a road cart; the horse ran down a rough mountain side and she was dragged, and all that remained of one ear was a little portion of the cartilage which was attached to her head. By cleansing that, scraping the sand and dirt out of it, that ear grew back to the head. Many of these tissues can be saved. They can be cut off later, if necessary, but I think the cartilage of the ear itself shows, perhaps, more vitality than any other portion of the body.

Fraeture of the nose also should be remedied immediately, providing the condition of the patient is such it can be done, and in reducing fraetures of the nose a method that I have found practieal is to put into the nose the lubricated beak of a large sound. Using the long shank as a lever you can mold that nose into any position you wish. Run your sound through so that you will know that the air passage is not obstructed. Repeat that on the other side if it is indicated, and you will be surprised how easy it is to reduce these fraetures.

A MEMBER: I would like to ask the gentleman how well the circulation was maintained in the ear that was replaced.

DR. MCSWEENEY: In one of these cases, the ear was almost avulsed. It was torn from the scalp and was hanging by a little skin at the lower end of the lobe. The other case was that of a man who had also sustained a fraeture of the skull. In the first case, I sutured the ear back onto the side of the man's head, and at the end of fifteen days it was completely healed. The resultant scar was only an indistinct line. In the settlement of the case, there was a difference of \$1,000 between him and the adjuster. After several hours of controversy they came in and laid the situation before me. I advised a compromise to which they agreed. The patient left the hospital satisfied, and the Claim Adjuster marked the case closed. Here was a case that might have cost the railroad a large sum of money, had the settlement not been made at this time.

SAME MEMBER: What I had in mind was whether that ear maintained the warmth of the other ear, or whether that ear was lost to the man because of freezing, etc.

DR. MCSWEENEY: I am unable to answer that question, as the patients returned to their homes in different states.

(This concludes the transactions of the New York and New England Association of Railway Surgeons' Thirty-Sixth Annual Meeting.)



# TORSION OF THE SPERMATIC CORD IN AN INFANT

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ABOUT two years ago<sup>1</sup> I reported two cases of torsion of the spermatic cord in adults and reviewed the literature up to that time. The condition, though not rare, is of surgical interest especially because acute torsion may be, and very often is, mistaken for strangu-

nosis in order to carry out a conservative operation. At the first signs of torsion the testis can be fixed, but if tuberculosis is suspected the organ may be removed.

The great majority of cases of torsion of the spermatic cord occur at about the age of puberty, or later. It is comparatively rare in infants, and with such very young patients a clinical diagnosis is less likely to be made than in an adult. I have recently operated on such a case in the American Hospital of Chicago.

## CASE REPORT

The patient was a fairly well-developed and nourished child, aged six months, who was admitted to the hospital on November 5, 1926, referred by Dr. Boris Berkman.

The child had had measles and whooping-cough.

The present illness began three days before Dr. Berkman brought him to the hospital, with vomiting, difficulty in retaining food, difficult defecation, and tenderness in the left lower abdomen.

Physical examination disclosed nothing of consequence except in regard to the abdomen, which showed some tenderness and rigidity throughout. There was pain to touch, more especially in the left inguinal region, with tenderness and swelling over the testicle and inguinal canal. The testes were fully descended.

A diagnosis of incarcerated inguinal hernia was made, and operation was decided upon.

An incision was made over the tumor in the left inguinal region; the tissues here were found much inflamed and swollen to the size of a thumb. On opening the canal the spermatic cord was found to be thrombosed, and the normally developed testis bluish-black in appearance, its vessels all congested and partly gangrenous. The vessels of the funiculus spermaticus were markedly thrombosed; the entire cord was acutely inflamed and twisted three



FIG. 1.

lated inguinal hernia. Correct preoperative diagnosis, however, is not of importance as either condition calls for immediate surgical treatment.

The subacute and chronic types of torsion may simulate the symptoms of epididymal tuberculosis, especially if the patient has any history of phthisis. As Legue<sup>2</sup> has remarked in a recent discussion, it is desirable to make an early correct diag-

times on its own axis. The vas deferens was also congested, discolored and distorted.

As attempts at detorsion failed to restore circulation, the entire left testicle and cord were removed. The inguinal canal and external wound were closed. The child made a good recovery and left the hospital in excellent condition.

The accompanying illustration (Fig. 1) shows the gross condition of the organs as found at operation.

#### COMMENT

This case calls for no special comment, the general facts being in accord with the findings in similar reported cases. I am unable to offer any explanation regarding the mode of onset of the torsion in this case, as there was nothing abnormal in the anatomy of the organs as far as was observed.

In my previous paper I referred to more than 150 cases reported in the general literature. Since that time I find that cases have been reported by Escat,<sup>3</sup> de Vernejoul,<sup>4</sup> Massa<sup>5</sup> (two cases), Gutierrez,<sup>6</sup> Odasso,<sup>7</sup> Pagliere<sup>8</sup> (two cases), Nowland,<sup>9</sup> Sarmiento,<sup>10</sup> Sandberg,<sup>11</sup> Loubat and Mondain,<sup>12</sup> Capponago,<sup>13</sup> Irk<sup>14</sup> (two cases), Hamilton,<sup>15</sup> Petridis,<sup>16</sup> Day,<sup>17</sup> and Iselin.<sup>18</sup>

Hirsch<sup>19</sup> reported a case diagnosed as torsion of the spermatic cord, which on operation proved to be a tuberculous epididymis.

Nowland's and Day's cases were in infants. In Nowland's case the child was only nine days old, and the condition was associated with phimosis and congenital inguinal hernia. At operation the testicle was found extremely gangrenous and an orchidectomy was necessary. The child made a good recovery.

In Day's case the child was three months old and the testicle was ectopic. This case was diagnosed as strangulation of an ectopic testicle. At operation the right spermatic cord was found twisted "several times," and the conditions necessitated orchidectomy.

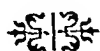
In the cases also of Odasso, Capponago, and in one of Irk's cases, the testicle was ectopic.

In the cases of Escat, de Vernejoul, Sarmiento, one of Irk's and Pagliere's two cases the torsions were intravaginal. In Irk's case there was torsion *en masse* of the testicle with the vaginal torsion, the latter enclosing a hydrocele and a loop of small intestine.

The general etiology and clinical features of torsion of the spermatic cord have been discussed in my previous paper and it would be redundant to repeat them here.

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# A MASTOID SUCTION-WIPER

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**O**BSERVATION over a period of years of the technique for mastoidectomy used by a number of surgeons both here and abroad gave me the impression that sponge-wiping of surgical wounds, and particularly those of bleeding, bony surfaces such as are encountered in mastoidectomy, radical frontal sinus operations and other osteoplastic procedures, does not provide the simplicity, facility or satisfaction that suction methods offer.

Those who from time to time are forced to accept the help of untrained assistants or inexperienced interns appreciate the annoyance and the delay frequently encountered under such conditions. The use of sterile gauze wipes, while simple enough, entails a certain degree of skill and a knack secured only by considerable experience.

Not infrequently the assistant is in the operator's way more than he is a help, and the time used to exert firm pressure of a gauze mastoid wipe and its removal is often two or three times as long as needed; so in using four or five dozen wipes during a single operation, if only three or four seconds are lost in the handling of each sponge, a delay of many minutes is sustained, which in certain cases contributes to the shock of the operation, and also causes frequent momentary interference with the surgeon's manipulations.

In order to avoid this delay and to maintain a constantly clear and unobstructed vision of the operative field, not possible with sponge-wiping, I devised, in 1924, a simple mastoid suction tip which I have called a "mastoid suction-wiper." It acted so satisfactorily that I requested the George P. Pilling & Son Co. to make an improved model, an illustration of which is given (Fig. 1).

I did not consider the device of much moment aside from finding it of value in my individual work.

Davis and Cushing<sup>1</sup> and Hahn<sup>2</sup> advocate the same method. Hahn states that "suction methods are an improvement over sponging in intracranial operations."

I also found suction methods far superior to sponge-wiping of bleeding bony surfaces and can recommend it most highly to otologists, orthopedists, neuro-surgeons and others whose fields involve osseous wounds.

*Description.* The mastoid suction tip (Fig. 1) that I use consists of a stiff tubular shaft (A) bent somewhat S-fashion. At the distal or suction end (B), the tube "flares" into a somewhat flattened bell shape, in the end of which, and with its longest diameter running transverse to the long axis of the curved shaft, is a slot-like opening (C) leading up into the round channel of the tube. A short distance from the suction tip end, the tubular shaft on its inferior concave border is attached to a ring-like spring-clip band (D) through which the surgeon passes his middle or index finger (Fig. 2), the ring fitting its circumference sufficiently snugly to give a firm grip. At the proximal end (E) the tubular shaft terminates in a bulbous extremity over which the rubber tubing is slipped, the latter connecting with the bottle of the suction pump apparatus.

The first assistant wears a similar suction tip which, however, he carries on the distal phalanx of his right index finger.

*Technique.* The first assistant is instructed in the proper use of the mastoid suction-wiper before the operation. This is so simple that much less difficulty is

<sup>1</sup>Davis, L. E., and Cushing, H. Experience with blood replacement during or after major intracranial operations. *Surg., Gynec. & Obst.*, 1925, xl, 310-322.

<sup>2</sup>Hahn, E. V. Notes on the Davis and Cushing method of salvaging blood during major intracranial operations. *Surg., Gynec. & Obst.*, 1925, xli, 107-108.

experienced than in instructing him in sponge-wiping.

The suction-wiper and the rubber tubing leading to the suction bottle are sterilized by boiling, and the rubber-gloved terminal phalanx of the right index finger is passed through the ring of the instrument, which fits the finger snugly.

Immediately before the operation begins, the suction apparatus is tested by immersing the end of the suction tip in sterile normal saline or 2 per cent sodium citrate

the assistant may be occupied with some other detail, he has the additional advantage of being able to perform his own "sponging" at a particularly desired point without any loss of time.

In those not infrequent cases of mastoiditis where considerable free pus wells up into the osseous wound upon removing the cortical layers, one can immediately suck away by means of this device not only the freely flowing pus that might contaminate uninfected areas, but also



FIG. 1. Mastoid suction-wiper. A. Hollow tubular shaft; B. Distal flattened end; C. Slot-like opening; D. Spring-clip circular band; E. Proximal bulbous end for attaching rubber tubing from suction bottle.

solution, a small bowl of which is at hand during the operation for frequent immersion of the tip to keep it free from blood clots.

The assistant stands opposite to the surgeon and at the beginning of the operation, from the skin incision to the completion of the osseous excavation, he dexterously applies the suction-tip to the blood-flooded field, a simple flexing motion of the finger bringing the suction end of the instrument to the bleeding area. By a somewhat sliding motion along the wound, in either a longitudinal or horizontal direction, for which the flattened shape of suction-tip end is admirably adapted, the entire field can be kept practically bloodless from the beginning to the end of the operation.

The surgeon himself will quickly become adept with the device as he finds that it does not interfere with the use of either the rest of his fingers or the hand, or with manipulation of instruments, whether scalpel, gouge, forceps, or bone mallet. Thus, at a particularly important instant, when



FIG. 2. Mastoid suction-wiper attached to index finger of right hand by means of spring-clip circular band (D). It may be worn on the middle finger. Note that index finger and thumb are free to grasp other instruments.

loose or semi-detached granulations, minute bone particles, etc., which are quickly and readily carried away.

In the case of free pus, as soon as all in view is sucked away, a freshly sterilized suction tip should replace the soiled one.

In such cases where the brain plate or sinus plate has been accidentally injured or there is reason to believe the dura or sinus is diseased or exposed by disease, the suction-tip end makes an admirable diagnostic instrument.

This suction tip has proved of great value in radical frontal and maxillary sinus operations, helping to maintain a

field free from obscuring blood, pus and débris, not nearly so easily accomplished by sponge-wiping.

My chief object in publishing a description of this device is to recommend the principle of suction most highly to those who as yet have not tried what has

proved to be a most valuable "silent assistant."

I heartily concur with Davis, Cushing and Hahn in the superiority of suction over sponge-wiping in cranio-osteal surgery and earnestly commend its trial by osteoplastic as well as aural surgeons.

## A GENITAL SUPPORT FOR PERINEAL OPERATIONS

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THE external genitals of a male patient prepared for a rectal operation often embarrass the surgeon by slipping out of the sling bandage with which they

placed in position, one border of a small towel is raised along the perineum to the base of the scrotum and is drawn snugly around the genitals at the pubes where it

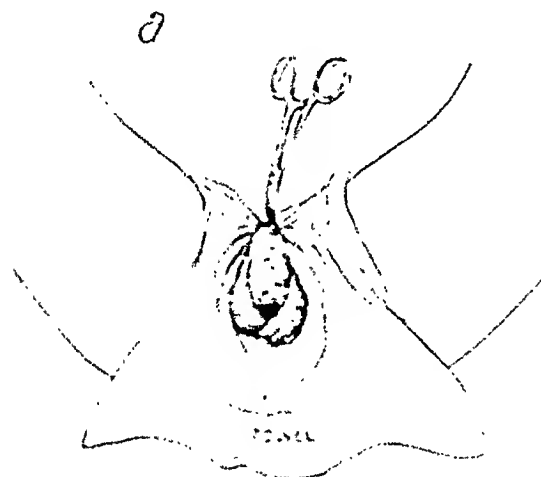


FIG. 1.

are supported. In our service an ordinary small towel has served our purpose admirably. When the patient, prepared, is

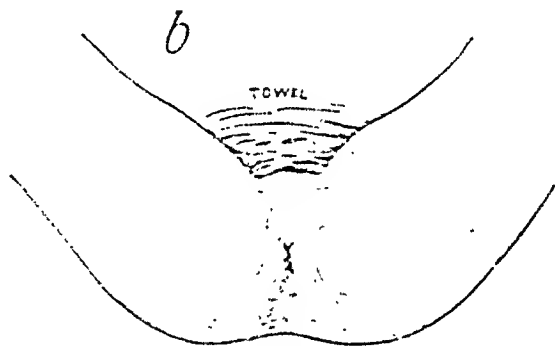


FIG. 2.

is grasped with a hemostat (Fig. 1). The lower free border of the towel is then raised and spread upon the patient's abdomen under the other sterile covers (Fig. 2). Should occasion demand the introduction of a urethral sound no disarrangement of the dressings is necessary.



## GAS BACILLUS TOXEMIA IN INTESTINAL OBSTRUCTION AND PERITONITIS

RECENTLY discussing gas gangrene<sup>1</sup> we mentioned that Prof. H. Vincent, of Val-de-Grace, has urged the use of polyvalent gas bacillus antitoxin in the treatment of all phlegmons produced by anaerobic organisms, including para-intestinal suppurations, such as those of appendicitis. For several years some of the French surgeons have, indeed, been using mixed anti-gas-gangrene sera in "gangrenous appendicitis" cases, with what has been interpreted as a considerable reduction of mortality. In these cases the Welch and other gas-producing bacilli that may be found in the neighborhood of the appendix are probably secondary invaders from the bowel, where they are often to be found normally in moderate numbers. Under certain conditions, however, these bacilli may proliferate in the intestine; and it is in this connection that an hypothesis quite worthy of serious consideration and investigation is presented by B. W. Williams of London.<sup>2</sup> This hypothesis is that the toxemia of ileus, whether a mechanical obstruction or the intestinal paralysis of peritonitis, is the toxemia of gas-forming organisms, especially bacillus welchii.

Williams calls attention to a striking similarity between the systemic symptoms of gas gangrene and those of ileus: repeated vomiting; cold nose, ears and extremities; rapid, thready and then imperceptible pulse; clear mentality and euphoria. He finds that in intestinal obstruction there is an enormous proliferation of anaerobic bacilli in the stagnant alkaline contents of the small intestine. By injections into mice, protected and unprotected by Welch

bacillus antitoxin, of filtrates from the contents of obstructed loops of small bowel (human and dog) he has, he thinks, produced evidence of the presence in such bowel of Welch bacillus toxins. Certain changes he has found in the hearts, great vessels and livers of patients dying of peritonitis and of acute obstruction are compatible with absorption of bacillus welchii toxin. He has had high titered bacillus welchii antitoxic serum (English) administered in cases of general peritonitis and of intestinal obstruction, with a much lower mortality than in previously treated cases of the same kind, operated upon by the same surgeons and in the same (St. Thomas') hospital.

In the complicated, teeming flora of the stagnant intestine, bacteriological studies are manifestly difficult, and conclusions must be drawn with caution. Williams appreciates this and also the pitfalls of clinical tests. He recognizes that there are gaps between theory, reasonable presumption and conclusive demonstration. Nevertheless, he has presented an hypothesis that needs give us pause, and sufficient painstaking observations to make that hypothesis worthy of further laboratory and bedside tests. If gas bacillus antitoxin will overcome the toxemia of paralytic and of mechanical ileus, we can manage surgically diffuse peritonitis and obstruction with much better prospects of cure. It would be quite like the use of insulin in many threatening complications of diabetes: with it the surgeon is master of the situation; without it his patient is very apt to succumb. If, however, the toxemia of ileus is that of gas-producing bacilli, probably the Welch organism is only one of several that are active and

<sup>1</sup>AM. J. SURG., N. Y., October, 1926, n.s., i, 228.

<sup>2</sup>Williams, B. W. Importance of toxemia due to anaerobic organisms in intestinal obstruction and peritonitis. Brit. J. Surg., Bristol, Oct., 1926, xiv, 295.



mixed antitoxic sera would be more potent than the antitoxin of the Welch bacillus alone. Which brings us again to lament that we have in this country no mixed gas bacillus antitoxic sera!

W. M. B.

## A FORGOTTEN GERMAN MASTER OF SURGERY

Until the end of the first quarter of the twentieth century, the surgery of the Renaissance period had seemed a terrain so well explored and surveyed that few of us would venture to go beyond the well-considered judgments of such masters as Gurlt or Malgaigne or Allbutt. The bright particular stars in this firmament: Paré, Franco, Paracelsus, Würtz, Tagliacozzi and Clowes, are well known to all members of the surgical guild, and their writings have long since been analyzed and appraised by the authorities mentioned. But in 1925, Dr. Walter von Brunn, the accomplished historian of Rostock, published a text<sup>1</sup> of such basic importance that it will necessitate a certain revision of values. This text is the "Practica Copiosa" of Caspar Stromayr, a herniotomist and cataract coucher of Lindau, who completed his manuscript in 1559, one year before Fabry of Hilden (1560-1634), the "father of German surgery" was born. Little or nothing is known of the life and achievement of this *magister ignotus*. As his editor says with entire justice, he would long since have taken his place beside Paré and Franco but for the fact that his manuscript lay unnoticed, like the Sleeping Beauty in the fable, for nearly four centuries, in the city library of his native town. It was not until 1909 that Pastor Wolfart, the late city librarian of Lindau, made a fleeting reference to it in his history of the city, which he followed up with a lecture on early wound-surgeons and barbers, based upon Stro-

<sup>1</sup>Die Handschrift des Schnitt- und Augenarztes Caspar Stromayr in Lindau im Bodensee. In der Lindauer Handschrift (P. 1. 46) vom 4. Juli 1559. Mit einer historischen Einführung und Wertung von Dr. med. Walter von Brunn. xxvii, 194 pl., 1 l., 168 col. pl. 4°. Berlin, 1925.

mayr's text, and delivered in Lindau and Augsburg. The manuscript of this lecture has been lost. In April, 1910, however, Sudhoff had the Stromayr MS. sent up to his Institute to be photographed, but there it lay for over another decade, until Dr. von Brunn, at Sudhoff's instance, took it up and brought it to the attention of the Rostock Medical Society in the autumn of 1923 and of the Congress of German Naturalists and Physicians at Innsbruck in September, 1924. The somewhat insignificant fragment on the eye had meanwhile been published, with three of the colored drawings, by Greef and von Haselberg in Graefe's *Archiv*.<sup>2</sup> Of the original manuscript, which he was privileged to exhibit at Innsbruck in 1923, von Brunn says that it might have been penned yesterday, so dead black is the ink, so sharply etched the handwriting and delineation, so fresh and bright the colors of the hand drawings. This unknown surgeon was a very skilful artist.

Stromayr belonged to the class of "incisors" or wandering surgeons, who at length settled down in some community to practice their art and "live happily ever after." Some of these vagabond or barber surgeons were reckless, unscrupulous charlatans, it is true, but out of their class came Paré and Franco, and of them Hirschberg has said: "It was at the hands of the unlettered wound-surgeon and barber, a mechanic in the most literal sense, that surgery and practical ophthalmology attained a new birth and to me, the outstanding fact about these men is that they wrote, not the Latin of the learned, but their mother tongue." Or as Allbutt has expressed it: "It was out of the mouths of barbers and cutters that medicine breathed her lowly message to her children."

The manuscript is a handsome layout of 195 pages of clear, neat chirography, with 151 full-page colored drawings, bound

<sup>2</sup>Greef and von Haselberg. Bruchstücke einer unveröffentlichten deutschen Augenheilkunde von Bartisch von Königsbrück. (Von Caspar Stromayr.) *Arch. f. Augenb.*, Wiesb., 1913, lxxv, 117-126.

in the characteristic parchment of the sixteenth century. The bulk of the manuscript is on hernia, with an appendix on cataract, followed by additional observations on hernia and an insignificant tract on the anatomy of the eye, illustrated with pictures from the German Vesalius ("Anatomia Deutsch") of 1551. In the original manuscript, the pages are not numbered and the pictures are interspersed. The pages were subsequently numbered by Sudhoff, and the pictures segregated at the end by the editor, with footnotes indicating their location. Apothecaries' measures and Arabic numerals have been substituted for the medieval equivalents.

It appears, from the scholarly introduction of the editor, that the operation for hernia was bungled with appalling frequency by the strolling incisors, for the outlines of technique in the medieval textbooks were hazy and inadequate, while the attitude of the greater surgeons was conservative and sometimes safeguarded by legal contracts guaranteeing their immunity, if the operation failed when performed upon a great noble. Thus one enterprising cutter is known to have castrated no less than 200 children in Breslau alone, and, even in the eighteenth century, a French bishop found 500 children similarly mutilated in his district. Castration was, in fact, the crux of the whole matter. Saliceto and Lanfranc urged as best they could against the barbarous procedure. Guy de Chauliac, whose attitude toward surgery was not practical but literary, said that the operation was not possible without castration. Paré, always splendidly human in such matters, prescribed the truss in place of the *point doré* (tight binding with gold wire), but his invention was not particularly efficient or satisfactory. Parents wantonly sacrificed their children to the incompetence of rascally vagabonds, but some incisors, notably the Norsini and Preciani in Italy, were conservative and honorable and transmitted their method from generation

to generation. To this class belonged the Provençal surgeon, Pierre Franco, of whom Nicaise said, "He did more for hernia, stone and cataract than Paré."

The merits of Stromayr are that, independently of Franco, whose treatise on hernia was published in 1561, he devised and wrote down a complete set of technical directions for operating on inguinal, scrotal and femoral hernia, to which he added directions for treatment of tumors of the testicles, hydrocele and prolapse of the uterus, with particular chapters on the regional anatomy, instrumentation, trusses, wound-drinks, wound infections and the like. Some twelve pages and twelve plates are devoted to the preparations for the hernia operation, which included shaving the parts, bathing the patient, adjusting him to an operating table of steep inclination, fixing the fee, prayers and binding the patient, whose arms and legs were then firmly grasped by two muscular assistants, while a third assisted the surgeon at the wound. In the ensuing operation, testes and spermatic cord were isolated *en masse*, ligated, excised and subsequently burned, along with the sac. The nine pages on hemostatic measures indicate the hopelessness of grave hemorrhage before the days of the ligature. Wound-drinks were non-alcoholic and designed only to still thirst. In the illustrations, each of which is capped by a quaint rhymed distich reminding us of Longfellow's translations from Friedrich von Logau, we get a rewarding sense of the facial expression, physique, costumes and social status of the small-town people of the German Renaissance, as well as of the colorful interiors, with their tiled floors, translucent windowpanes, arched doorways, plate-rails and high-backed bedsteads. In the operating scenes, the patients are represented as yelling lustily. The anatomical pictures are frankly naked, and in some cases, e.g., the goitrous gardener on page 217, the occupation is indicated. The uterine procidentia, e. g., in the buxom dames on pages 330-334, is

depicted with highly colored realism. Some of the faces have still the cryptic, wall-eyed expression made familiar to us by the medieval artists, but most of the figures represent jocund, self-assertive Renaissance people. The work is thus of enormous cultural and historical value and will doubtless prove itself a standby for showing students just how surgery was done in the sixteenth century.

The section on cataract describes the condition but not the operation, which, up to the time of Daviel, was technically that of the ancient Hindu couchers. In this contribution, however, Stromayr antedated Bartisch (1583). Whether he actually wrote down his book on hernia before Franco is unknown. In any event, he now takes his place as one of the outstanding contributors to Renaissance surgery, worthy of record in all subsequent histories of the subject. If, through the long centuries in which his book lay asleep, his spirit may have murmured, with Brownig's unknown Florentine:

"So, die my pictures! surely, gently die!"

They were neither blackened "in the daily candle-smoke," nor fated to "moulder on the damp wall's travertine," and now assuredly this genial artist-surgeon has come into his own.—F. H. GARRISON.

## ANNOUNCEMENTS

*Surgical Suggestions.* With the establishment of the JOURNAL in 1905 we inaugurated an editorial department of "Surgical Suggestions," consisting of a page each month of "practical brevities in diagnosis and treatment," terse bits of information or advice, not pretentious of originality but based on actual observations by members of the editorial staff. These "diagnostic hints and therapeutic wrinkles" at once appeared to have a large appeal, for they were very widely quoted in medical journals throughout the United States and Canada and when, at the end of a year, they were reprinted in a small book, it had a large sale. In 1907 a larger edition, "500 Surgical Suggestions,"

was generously received by readers and by reviewers, as was "700 Surgical Suggestions," reprinted in book form in 1909. Of this, a German edition, "700 diagnostisch-therapeutische Ratschläge für die chirurgische Praxis," was prepared, with consent, by Dr. Ernst Schümann of Dresden, and published by Barth of Leipzig. By 1911 a thousand or more of these paragraphic surgical observations had been published in the JOURNAL, and "1000 Surgical Suggestions" then appeared in book form. Of this there was an unauthorized translation into Polish, and in 1914 we gave permission, upon request, for translation into Russian. Whether a Russian edition ever appeared, or the outbreak of the War interfered with its preparation, we do not know.

After fifteen years' editorial respite from the preparation of these random observations, we are starting in the next issue of the JOURNAL a second series of "Surgical Suggestions," in the belief, fostered by our earlier experience with them, that the most serious readers like to turn now and then from longer publications to paragraphic or epigrammatic bits of information, and that even the most seasoned surgeons sometimes find useful hints in the tersely stated observations of others. If the new series of Suggestions meets with some measure of the favor with which the older series was received, we shall feel that they serve their purpose.

*The Section of Genito-Urinary Surgery of the New York Academy of Medicine* at its December meeting adopted the JOURNAL as the medium for the official publication of its scientific transactions. Since many of the papers presented before this Section are by prominent urologists from various parts of the country, these transactions, which we shall publish, as nearly as possible, currently with those of the Section of Surgery, will have far more than a local interest. *The New York Urologic Society* has also selected the JOURNAL as the medium for the publication of its transactions. *The Section of Orthopedic Surgery of the New York Academy of Medicine* has

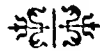
followed the lead of the Sections of Surgery and of Genito-urinary Surgery, and we shall publish its transactions beginning with its meeting of February, 1927.

*The Transactions of the New York and New England Association of Railway Surgeons* so far as they are embraced by the papers read at the last annual meeting (October, 1926) and their discussion are published complete in this issue of the JOURNAL.

*Index to Volume I.* In the December number the Index was separated from the

JOURNAL by a title-page which, unfortunately, was folioed in, and the first page of the Index was numbered 421. In binding, subscribers should remove the title page to the front of the volume, and renumber the Index pages 419 to 423, instead of 421 to 425.

Beginning with Volume II there will be, in addition to the Index, a Table of Contents which may be bound in front of the volume with the title-page.



## BOOK REVIEWS

PLASTIC SURGERY OF THE HEAD, FACE AND NECK. By H. Lyons Hunt, M.D., L.R.C.S. (Edin.), Licentiate of the Royal College of Physicians, Edinburgh; Licentiate of the Faculty of Physicians and Surgeons of Glasgow; Late Captain, M.C., U.S.A.; Consulting Plastic Surgeon, Midtown Hospital, New York City; Consulting Plastic Surgeon, Lexington Hospital, New York City; etc. 8vo. Pp. 404; 342 engravings and 10 colored plates. Price, \$7.00. Philadelphia and New York: Lea & Febiger, 1926.

Following the facial mutilations of the recent war, a great demand arose for the development of a type of specialized surgery which at least in a measure would rehabilitate the unfortunate sufferer and permit him to carry on without the extraneous handicap of facial disfigurement. The work of the great plastic surgeons, among them Gillies, Dufourmentel and Davis, has been such as to establish methods applicable alike to the problems of civil life as well as to those arising from the battlefield.

In a very excellent little work on the subject of plastic surgery of the face, head and neck, the author has outlined the principles to be employed in meeting the problems of cosmetic surgery. There are chapters on the character of the skin, the anesthetic to be used, the question of grafts and transplants and the treatment of wounds made in the pursuit of cosmetic results. The various chapters on the surgery of the different parts of the face, head and neck are preceded by brief reviews of the anatomy of the involved parts. Subsequently, the indications for operation and the nature of the operation advised are given with quite some detail. The volume is profusely illustrated and the bibliographical references are given at great length at the end of each chapter. This volume is a very timely, very well written and all in all very welcome addition to medical literature.

LEHRBUCH DER SPEZIELLEN CHIRURGIE FÜR STUDIERENDE UND ÄRZTE. Edited by Hofrat Prof. Dr. J. Hochenegg, Vorstand der II. chirurgischen Klinik in Wien; und Geh. Med.-Rat Prof. Dr. E. Payr, Direktor der chirurgischen Universitäts Klinik in Leipzig. Vol. I, Halves 1 and 2. 8vo. Price, 36 mk.

Pp. 1244, with 527 illus. Berlin: Urban & Schwarzenberg, 1927.

The first volume of the second edition of Hochenegg and Payr's textbook of special surgery differs but little from the earlier edition. Because of the death of a number of the former collaborators several of the chapters have had to be rewritten. But, as a whole, the original plan of presenting, for the purpose of students, only well-accepted information has been adhered to. All controversial matter has been excluded.

The present volume, because of its bulk, is divided into two parts. The first part deals with the special surgery of the head and neck. The second part is concerned with the discussion of the surgery of the thorax and its contents, the spinal column and cord and the pelvis. At the beginning of each chapter, there are introductory remarks on the anatomy, the physiology and the pathology of the organs under consideration. The various surgical entities are described in brief but interesting manner. The illustrations are relatively few but are well chosen and reproduced. Probably because of the fact that the work is intended primarily as a textbook for students, bibliographical references have been entirely omitted.

A TEXTBOOK OF EMBRYOLOGY. By Harvey Ernest Jordan, A.M., Ph.D., Professor of Histology and Embryology, University of Virginia; and James Ernest Kindred, M.A., Ph.D., Associate Professor of Histology and Embryology, University of Virginia. 8vo. Pp. 614; 471 illustrations and 33 plates. N. Y.: D. Appleton and Co., 1926.

An appreciation of embryology is essential for the interpretation of many medical and surgical conditions. Reference volumes frequently confuse those lacking an adequate grasp of the elementary facts. It is for this reason that Jordan and Kindred's book will be of service, even though it is intended as a textbook for medical students. Representing the outgrowth of practical courses, the fundamental embryological data are presented that are essential for an appreciation of human development. Anatomical differentiations in

development are stressed although functional interpretation is adduced where requisite to clarify the principles of structure.

There is naturally some irregularity in the emphasis placed upon topics, but taken as a whole the volume constitutes an acceptable, useful textbook. Particularly commendable is the variety, profusion, and usefulness of the illustrations which are clear and in all instances serve to clarify the text. The book's value for teachers is enhanced by the inclusion of a chapter on Laboratory Exercises, with an abundance of drawings to assist students in interpreting the results of their laboratory studies.

#### A BIPOLAR THEORY OF LIVING PROCESSES.

By George W. Crile. 8vo. Cloth. Price, \$5. Pp. 387; illus. N. Y.: Macmillan Co., 1926.

Most theories are advanced by their authors to explain all the known facts in their particular category. Crile undertook what might be called, in the vernacular, "some job" when he tackled an explanation of life. His bipolar "electric battery" theory of animal function, interesting and suggestive though it be, falls far short of acceptability.

In spite of all the calculus and determinations to the fifth decimal he naively remarks that "final proof is lacking in practically every point."

Has Crile allowed his fancy to meander into the limbo of the unknown as a relaxation from the very strenuous and practical work of a surgeon, or, as Jennings surmises, has he deliberately placed his clever tongue in his cheek and written this book as a parody on much of the research that encumbers medical literature? In either case it is an interesting revelation of his fine imagination. It deserves consideration for the collecting and marshaling of hosts of facts, and also because, right or wrong, Crile is here, as always, a stimulator of medical thought, an inspirer into the realms of research, a physician-philosopher.

#### RATIONAL GLAND THERAPY FOR WOMEN.

Particularly in Relation to Menstruation.

By I. Wanless Dickson, M.B., F.R.C.S., etc. 12mo. Cloth. Price, \$2.00. Pp. 96. N. Y.: Paul B. Hoeber, Inc., 1926.

This little book is based on the clinical observations of the author with occasional references to the literature prior to 1917. It

has the shortcomings of so much purely clinical literature in that the observations are recorded and inferences are drawn without adequate critique.

The absence of any reference to the recent brilliant work of Robert Frank, of Evans, and of Stockard is difficult to explain and calls for an early revision.

**HANDBUCH DER BIOLOGISCHEN ARBEITSMETHODEN.** By Geh. Med.-Rat Prof. Dr. Emil Abderhalden, Direktor des Physiologischen Instituts der Universität Halle a. d. Saale. Section IV, ANGEWANDTE CHEMISCHE UND PHYSIKALISCHE METHODEN, Part VI, 2nd Half, No. 1. 8vo. Price, 6.60 mk. Pp. 140, with 8 illus. Berlin: Urban & Schwarzenberg, 1926.

This is a valuable and timely addition to Abderhalden's monumental text. The present great interest in liver function will insure frequent reference to its pages, wherever physiological and experimental problems are being investigated.

Its deals with test injections of the portal vein and with other chemical tests of liver function, the execution of Eck fistulae, liver extirpation in geese and dogs, Pavloff fistulae and the comparative study of digestion, all by distinguished authorities.

**MODERN CLINICAL SYPHILOLOGY.** Diagnosis; Treatment; Case Studies. By John H. Stokes, M.D., Professor of Dermatology and Syphilology in the School of Medicine, University of Pennsylvania; Professor in the Graduate School of Medicine, University of Pennsylvania; etc. With the Cooperation of Paul A. O'Leary, M.D., and William H. Goeckermann, M.D., Section on Dermatology and Syphilology, The Mayo Clinic; and Loren W. Shaffer, M.D., and Cleveland J. White, M.D., Department of Dermatology and Syphilology, School of Medicine, University of Pennsylvania. 8vo. Cloth. Price, \$12.00. Pp. 1144 with 865 illus. Phila.: W. B. Saunders Co., 1926.

This textbook is an achievement of which American Medicine may be proud. Probably more great textbooks have been written on syphilis than on any other one disease, but they were written before the discovery of the *Spirochaeta pallida*, the introduction of salvarsan, the experimental study of the disease in animals, and of our present understanding

of the invasion and sojourn of the syphilis organism in man.

In this work, which discards nothing from our clinical heritage, the laboratory's contribution is given intensive and judicial description. The style is fascinating and the large number of original illustrations capture attention and point the lessons in the text. Just as no practice escapes contact with syphilis, so no physician or surgeon can afford to be unfamiliar with the facts and opinions nowhere so fascinatingly and authoritatively stated as in this splendid textbook.

#### PRINCIPLES AND PRACTICE OF CHEMOTHERAPY.

With Special Reference to the Specific and General Treatment of Syphilis. By John A. Kolmer, M.D., D.P.H., D.Sc. (Hon.); Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania, and Member of the Research Institute for Cutaneous Medicine. 8vo. Cloth. Price, \$12.00. Pp. 1106, illus. Phila.: W. B. Saunders Co., 1926.

Wherever syphilis is seriously studied this volume will be needed for reference and as a spur to further contributions to a subject which, though still in its infancy, has made Brobdingnagian strides. Professor Kolmer's book is a monument to his industry and fills a need in English medical literature.

In the strictest sense all drug therapy is chemotherapy. Kolmer chooses the sterilization of the blood stream as his field. The several parts treat of the Principles of Chemotherapy, Chemotherapy of Bacterial and Mycotic Diseases, Chemotherapy of Trypanosomal Diseases, of Spirochetal Diseases other than Syphilis, of Protozoan and Metazoan Diseases other than Trypanosomal and Spirochetal Diseases, of Diseases of Doubtful or Unknown Etiology, Infection, Immunity, and Pathology of Syphilis in Relation to Treatment, etc.

THE NORMAL CHILD AND HOW TO KEEP IT NORMAL IN MIND AND MORALS. Suggestions for Parents, Teachers and Physicians; With a Consideration of the Influence of Psychoanalysis. By B. Sachs, M.D. 16mo. Price, \$1.50. Pp. 111. N. Y.: Paul B. Hoeber, Inc., 1926.

With such an abundant evidence of saneness and counsel, it is regrettable that Sachs has written with such brevity. The chapter on The Evils of Psychoanalysis particularly

merits reading at this time, when the master Freud is being betrayed by so many of his disciples.

LEHRBUCH DER PHYSIOLOGIE. By Emil Abderhalden, o.ö. Prof. und Direktor des physiologischen Instituts der Universität Halle a. S. Part III. SINNESFUNKTIONEN. 8vo. Price, mk. 33. Pp. 650, with 304 illus. and 20 Colored Plates. Berlin: Urban & Schwarzenberg, 1926.

This is a series of lectures on the physiology of the special senses with splendid illustrations, suitable for students or practitioners. It is a splendid example of German scholarship and industry.

HYGIEIA OR DISEASE AND EVOLUTION. By Burton Peter Thom, M.D. 12mo. Cloth. Price, \$1.00. Pp. 107. N. Y.: E. P. Dutton & Co., 1926.

THE MEANING OF DISEASE. An Inquiry in the Field of Medical Philosophy. By William A. White, A.M., M.D. 12mo. Cloth. Price, \$3.00. Pp. 220. Baltimore: Williams & Wilkins Co., 1926.

These two little books delightfully marshal facts in support of philosophical theses.

Hygieia's accomplishments and promises are recounted by Thom for laymen though physicians may well spend with her a pleasant hour.

White's volume is more profound. He emphasizes the importance of the psyche in all disease states and concludes that "disease is regressive; disease is an attempt at energy equilibrium."

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences, Edited by Hobart Amory Hare, M.D., LL.D., Professor of Therapeutics, Materia Medica and Diagnosis in the Jefferson Medical College, Philadelphia, etc., assisted by Leighton F. Appleman, M.D., Instructor in Therapeutics, Jefferson Medical College, Philadelphia, etc. Vol. iii. Sept., 1926. Vol. iv, Dec., 1926. Phila.: Lea & Febiger, 1926.

These volumes maintain the tradition of a useful digest of medical literature. The reviews are complete and well-balanced summaries of progress during the preceding year.

# PROGRESS IN SURGERY

Selections from Recent Literature

REICHERT, FREDERICK LEET. The regeneration of the lymphatics. *Arch. Surg.*, Dec., 1926, xiii.

Regeneration of lymphatics has been demonstrated under conditions closely approximating the normal. The results are based on injection experiments in replanted limbs of dogs. New lymphatics are shown to cross a scar as early as the fourth day and by the eighth day the regeneration is physiologically adequate in both the deep and the superficial sets of lymphatics. Concurrent experiments have shown that compensatory arterial and venous regeneration occur by the third and fourth day, respectively. Stasis of the lymphaticovenous system provides a stimulus for the regeneration of both groups of lymphatics.

Proof is advanced that the lymphatics play an important rôle in assisting the veins in overcoming edema and restoring a limb to its normal condition. Study of the postoperative edema following replantation of the limb leads to a better understanding of such postoperative changes as edema and induration of the skin and subcutaneous tissues after dissections of the glands of the neck.

These studies on lymphatic regeneration offer reasons for surgical procedures in treating malignant conditions; namely, the primary growth should be removed before or at the same time as the regional glandular dissection. If, as is sometimes practiced, the clean operation of removal of glands is done a week or more before the primary growth is excised, sufficient time will have elapsed for the regeneration of new lymphatic channels.

HIRSCH, MAXIMILLIAN. Should thrombosis of varicose veins be undertaken without antecedent ligation of the saphenous vein? (*Ist die künstliche Thrombosierung variköser entarteter Beinvenen ohne vorherige hohe Ligation der Vena saphena zulässig?*) *Wien. klin. Wchnschr.*, Nov. 4, 1926.

The author calls attention to the possibility of sudden death as a result of embolus following thrombosing of varicose veins by means of chemical injections. He suggests therefore that in all such cases the internal saphenous vein be ligated high before undertaking injection of

the veins. By this procedure the thrombus that is formed cannot be washed into the general circulation and, too, there is given more opportunity for the formation of a definite thrombosis of the diseased veins.

DAVIS, DAVID. The determination of the icterus index with capillary blood. *Am. J. M. Sc.*, Dec., 1926, clxxii, 848.

A new and very simple clinical method for the determination of the icterus index is presented; a few drops of blood are centrifuged in a 2-mm. tube and the serum is compared with standards.

Venipuncture is obviated by this method, which therefore is convenient for frequent determinations and is particularly suitable in children and infants. The test is accurate and reliable.

CRADDOCK, FRENCH H., and WHETSTONE, GERTRUDE. Diathermy in the treatment of shock. *South. M. J.*, Nov., 1926, xix, 812.

The authors report the case of a man admitted to a hospital in a condition of extreme traumatic shock. His pulse was imperceptible, he was in a cold clammy sweat and generally prostrated. He had fallen 80 feet from a railroad bridge, striking on hard ground, among rocks, and sustaining several fractures. Block tin electrodes were placed on each wrist, and about 500 ma. diathermy were given for thirty minutes. Soon the upper part of the body became warm, the cold clammy sweat ceased, and the radial pulse could be felt. The electrodes were then placed to each ankle and the process repeated, which gradually warmed the lower part of body. The temperature was raised from 96°F. to 99°F., and the patient began talking, regaining consciousness gradually. The reduction of fractures was possible about twelve hours later, and the patient made a good recovery.

Crile has reported the prevention of shock in operative cases with the diathermy machine, by passing the current through the liver. In shock there is an extreme loss of heat, and the diathermy machine is the best method the authors have found for generating internal heat. All methods of supplying heat externally have proved slow and unsatisfactory.



PLATOU, E. S., and RIGLER, LEO. Roentgen-ray therapy in erysipelas. *Arch. Int. Med.*, Nov. 15, 1926, xxxviii, 573.

The present methods of treatment of erysipelas are distinctly unsatisfactory and accomplish little.

Roentgen-ray therapy applied to the affected part produces a rapid improvement in both the local and the systemic manifestations, with a reduction of temperature to normal in from one to two days.

In a group of cases treated by the routine methods and a similar group treated by roentgen-ray irradiation, vastly superior results in the irradiated group were shown.

Treatment with the roentgen ray is an effective method for shortening the course and decreasing the morbidity and mortality in erysipelas.

LEWALD, LEON T. "Cyclic vomiting" in infants and children. Including an analysis of the occurrence of vomiting in two hundred children examined roentgenologically. *Radiol.*, Nov., 1926, vii, 410.

1. In a series of about two hundred infants and children referred for roentgen examination on account of chronic disorders of the digestive tract, a history of recurrent or cyclic vomiting was obtainable in at least one-third of the cases.

2. The cases were nearly equally divided as to sex.

3. A previous diagnosis of acidosis had been made in at least 20 per cent.

4. The predominant roentgen findings related to the colon, particularly redundancy.

5. Pylorospasm, dilatation of the stomach, and ptosis of the stomach were frequent additional findings.

6. Roentgen evidence of chronic appendicitis sufficient to warrant operation was encountered in only a very few instances. The appendix should never be removed for supposed chronic appendicitis without a thorough roentgen examination of the digestive tract in order to exclude other abnormalities, or to obtain confirmatory evidence of chronic appendicitis and to find the exact location of the appendix. Forty-eight cases of left-sided appendix have been found on roentgen examination by the author, associated with either complete transposition of the viscera or non-rotation of the colon.

7. In two cases the appendix had been removed previously without relief.

8. In one case in which the gastrointestinal tract was negative, operation for correction of internal strabismus cured the vomiting attacks.

9. Cyclic vomiting is not an entity, and has no specific cause.

10. It is probably of reflex nature and usually is associated with abnormalities in some portion of the digestive tract.

SICARD, J. A., and FORESTIER, JACQUES E. Roentgenological exploration of spinal and cerebral spaces, genito-urinary organs and other organic cavities with iodized oil. *Radiol.*, Nov., 1926, vii, 385.

Lipiodol is a safe means of contrast for radio-diagnosis. Beside the principal roentgenological uses of lipiodol (bronchial tubes, and cavities of the spine), there exist several of minor importance but of interest. Uterus and fallopian tubes, cold abscesses, the male urethra, vas deferens and seminal vesicles, facial sinuses, lachrymal ducts, biliary fistulae and limb arteries have been thus explored and valuable results in diagnostic respects have been obtained.

Lipiodol has proved quite useful for experimental purposes, especially for the visualization of the blood stream and the exploration of the permeability of the capillary networks in animals.

STEVENSON, WALTER C. The rationale and technique of combining operation with radium treatment in cancer. *Lancet*, Dec. 4, 1926, cxxi.

Stevenson states that when operation and radiation are combined in the treatment of cancer: 1. There is no advantage in giving a lethal cancer dose of radiation first and delaying operation more than a week, as further delay increases the difficulty of the operation and the shock. 2. Over-radiation of a cancerous mass which cannot be completely removed, followed immediately by its partial removal, lessens the shock and the operative difficulties. 3. At the operation it is an advantage to bury radium tubes and needles in the incised area and in the paths of dissemination. 4. It is an advantage to radiate the whole operation and suspicious area about three weeks after operation when the incisions have soundly healed. 5. The patient's general condition is the best guide to the extent of the operation and the intervals of time at which different areas are to be efficiently radiated.

BRICKNER, WALTER M., and MILCH, HENRY. Surgical clinics from the Broad Street Hospital, New York. *Internat. Clin.*, Dec., 1926, S. 36, iv.

1. *Gas Gangrene Infections.* Discussing the pathology, bacteriology and clinical manifestations of gas gangrene, the authors report 4 cases in civil practice, all fatal in spite of active treatment. They deplore the fact that there is not available in this country a polyvalent antitoxin such as has been developed and successfully used by the French.

2. *Carcinoma of Terminal Ileum Causing "Sciatica."* This case is of interest because of the unusual location of the carcinoma and because by pressure in the pelvis it produced symptoms that had been for a long time treated as sciatica.

3. *Spinal Cord Injuries.* Reporting 3 cases of spinal cord injuries, the authors call attention, among other things, to the fact that a permanent paraplegia may result from an injury to the cord in which, at operation, however early, no gross change in appearance or texture can be discovered, and no blood is found within the dura.

PARHAM, F. W. Head injuries marked by intracranial tension. *New Orleans M. & S. J.*, Dec., 1926, lxxix.

Parham concludes:

1. No operation should be done in the state of shock. One of the measures calculated to help shock is the intravenous use of strong solutions of glucose.

2. Until shock is subdued, the time may be profitably spent in getting the history from witnesses and taking pulse, respiration, blood-pressure and temperature at intervals.

3. When the shock is relieved then a spinal puncture is made to get the intracranial pressure, always in a horizontal position and after waiting a sufficient time for adjustment before reading the manometer. The manometer is essential.

4. If the reading is moderately high the fluid is allowed to flow until the reading shows normal pressure. This is to be repeated at intervals of twenty-four hours or less in urgent cases.

5. If the reading shows very high pressure, enough fluid is withdrawn to bring the pressure to about one-half at the first puncture.

6. If the case is urgent the lumbar puncture may be aided and protected by an intravenous

injection of a 25 to 40 per cent solution of glucose. Danger of medullary jamming is thereby lessened.

7. If at the second puncture the response is satisfactory, the case should continue to be treated by lumbar puncture in conjunction with magnesium sulphate by rectum, preferably, or by stomach ingestion through a duodenal tube.

8. Should these measures fail to relieve the cerebral tension then subtemporal decompression should be done.

9. Subtemporal decompression should always be assisted by drainage unless there is infection. It seems not logical to do a decompression without draining (for not longer than forty-eight hours) the subtemporal space. Sachs drains in no instance, as he considers it dangerous.

10. In epidural hemorrhage the dura should also be opened if there are other signs of intracranial tension, unless the wound is septic.

11. Cushing, Putnam and many others have shown the bad effects of leaving a subdural hemorrhage which cannot be drained by lumbar puncture.

12. In bad cases of tension it may be advisable to puncture the ventricle on the side of the decompression.

13. It must be remembered that a saline or glucose intravenous injection will sometimes revive a man already showing Cheyne-Stokes respiration.

14. There is no reason why spinal puncture should not be done in any case where it is indicated. If it be done slowly, watching the pulse and respiration, it may easily be discontinued before trouble comes.

15. Should there be signs of danger after withdrawal of fluid, the danger may be overcome by an intravenous injection of 30 to 50 c.c. of a 25 per cent solution of salt or glucose, which should always be at hand for such emergency.

PATTON, E. W. Abnormally attached frenum labium with surgical interference. *Internat. J. Orthodontia, Oral Surg. & Radiog.*, Nov., 1926, xii, 1085.

Spacing seen between upper central incisors and sometimes, though seldom, between lower incisors is often caused by the overdeveloped and abnormally attached frenum labium.

When the frenum is abnormal as to size and attachment its fibers pass through between the

incisors, attaching oftentimes in a deep fissure formed by the maxillary bones, and ending in a tuft of tissue lingual to the gingival border of the gums. Upon raising the upper lip the frenum will be seen to spread out in fan-shape, losing the ends of its fibers in the lip.

Under gentle stimulation the space between the incisors is to be partially closed. When two-thirds closed, the frenum should be removed surgically. This operation is performed by anesthetizing the tissues, and with sharp bistoury, cutting down to the bone on each distal margin of the frenum and around the tuft of tissue on the lingual surface, thus enucleating the stricture. Then with sharp small curette the whole is peeled out from lingual to labial and from deep down in the fissure. With sharp knife or scissors it is then cut off about 5 mm. above the gingival border. A few sutures may be inserted, but rarely is this necessary. Teeth should now be moved into contact with each other, and retained there until fibers from each adjoining wall have united, and tissues have become fixed in their new environment.

JESBERG, SIMON. A method of removing a bead from a bronchus. *Laryngoscope*, Dec., 1926, xxxvi.

Smooth, round or oval foreign bodies in a bronchus tend to descend as far as possible, dilating the air tubes and permitting a partial collapse of the lumen above the body. Such a body, if hard and smooth, is almost impossible to engage with any usual grasping instrument, and if impacted there is insufficient room between it and the walls of the bronchus to permit the passing of an instrument around it. Even the slightest pressure pushes the foreign body deeper and impacts it more tightly.

In the case of a foreign body containing a hole, e. g., a bead, the sides of the hole can be used as a grasping surface. If, however, the hole is small, it is difficult to pass into it a probe or grasping forceps sufficiently strong to be safe.

The device here described consists of a steel stylet or probe, the distal end of which contains an eye through which a thin rubber band can be threaded. The probe with the stretched rubber band is made just small enough to pass through the hole in the bead. When this is accomplished the tension on the rubber band is released and the expansion of the rubber band locks the bead on the stylet.

CHAPMAN, T. L. Local anesthesia in toxic goiter. *Minnesota Med.*, Dec., 1926, ix.

Chapman makes use of infiltration only, proceeding carefully and quickly through the front planes until the surface of the gland is exposed, then infiltrating the loose connective tissue at the side and behind the lobes, seizing and raising them so that any necessary advancement of the edematized field can be easily made without pain. This can be done with a short needle without the slightest danger of injury to important adjacent structures. In his whole series no such injury has occurred, and anesthesia was entirely satisfactory. The solution used is 0.5 per cent procaine, in normal salt solution.

In two years, more than three hundred goiters, mostly of the exophthalmic type, were operated upon by this method, with no reason to feel that it failed in any instance in satisfactory anesthetic effect or in giving the greatest possible lack in undesirable after-effect to the patients.

With regard to time consumed in getting to the actual removal of the gland at operation, it is quite as rapid as with other methods, and there is the additional advantage that the infiltration edema produced makes for easy separation of anatomical planes with the greatest precision and minimum of bleeding.

In the severe and questionable cases local anesthesia will show frequently so decisive a gain over any other type of anesthesia that a distinct advantage over all other methods may be read in the mortality and morbidity records. By this mode of management, some extreme cases can be brought to surgery that by any other method are impossible and not to be considered.

On the surgeon's side can be credited these values: The anatomical relationships with local anesthesia are accurate and undisturbed, the edematization of the tissues making their dissection and separation quick and easy; the engorgement of the veins, so notable in nitrous oxide and ethylene anesthesia, is not seen. The control of blood loss is very accurate, and the advantage of a shortened operating time is thus secured. If doubt regarding hemostasis is felt, the patient can be called upon to cough or hold the breath, before closure of the deep field, to test the accuracy of the ligations. Test of phonation can be voluntarily employed by the patient during the operative maneuvers, if

it is believed that a recurrent laryngeal nerve may be in danger of injury.

SISTRUNK, W. E. The management of patients with goiter. *Minnesota Med.*, Dec., 1926, ix.

Clinically, practically all goiters may be classified under three types: colloid, adenomatous and exophthalmic. Combinations of these also occur. Colloid goiter is a goiter of youth, not associated with hyperthyroidism, and often responds to treatment by medicine. Adenomatous goiter also usually begins in youth. In younger people it is not found associated with hyperthyroidism. It produces a nodular, irregularly shaped goiter and over 20 per cent of the patients later develop a hyperthyroidism that differs from that seen in exophthalmic goiter. This type of goiter does not respond to treatment by medicines and should be looked upon as surgical. The most advantageous time for removal of such goiters is between the ages of twenty-five and thirty. Exophthalmic goiter may occur at any age. It is always associated with hyperthyroidism. It responds best to treatment by operation and the earlier the operation the better the end-result. Iodine used as a means of preparing patients with exophthalmic goiter for operation diminishes very greatly the chances of dangerous postoperative hyperthyroidism.

HIGGINS, C. C. Tuberculosis of the thyroid gland, with a report of five cases. *Internat. Clin.*, Dec., 1926, S. 36, iv.

Five cases are reported of tuberculosis of the thyroid gland from the service of Dr. G. W. Crile; these, in addition to nine cases reported in 1917, making a total of fourteen cases in his series.

Tuberculosis of the thyroid gland is rare.

In ten of the fourteen cases the gland showed increased activity.

Because in many cases of tuberculosis of the thyroid gland pulmonary tuberculosis is present, regional anesthesia should be used in all such cases, and a general hygienic regimen should be instituted to improve the patient's resistance and to further the healing of the pulmonary lesion.

McFARLAND, JOSEPH. Ninety tumors of the parotid region; in all of which the postoperative history was traced. *Am. J. M. Sc.*, Dec., 1926, elxxii, 804.

From this study McFarland concludes:

1. The theory of "enclavement" or accidental sequestration of embryonal cells during the early and complicated development of the face and neck affords the most satisfactory explanation of the origin of their mixed tumors.

2. By that theory it is easy to account for the number and variety of tissues found in the tumors, and for their varying proportions and conditions.

3. Mixed tumors are individual entities, having no relation to the normal structures in which they occur, but from which they do not arise.

4. They have nothing to do with other kinds of tumors, and should be called "mixed tumors" and nothing else, regardless of their histology.

5. They are inherently benign, but commonly recur after excision, and if frequently disturbed become locally destructive and invasive, without metastasizing.

6. The histology of mixed tumors is extremely complex, but on that account their microscopical diagnosis is usually very easy.

7. The immaturity, atypical arrangement and confused intermingling of the various tissue components easily lead to misinterpretations as to their nature and mistakes as to their dispositions.

8. Histological variations among mixed tumors have no bearing upon prognosis. The microscope, beyond showing that the lesion is a mixed tumor, is misleading rather than enlightening.

9. The rapid enlargement of a mixed tumor of long duration and slow growth is not the result of malignant change.

10. Malignant change, whether "sarcomatous" or "carcinomatous," in mixed tumors must be rare, and its occurrence is difficult to prove.

11. As intervals of ten, twenty and even thirty years may elapse between the operative removal of a mixed tumor and its recurrence, caution should be exercised in declaring any case cured.

BÁRSONY, THEODOR. Functional esophageal diverticula. (*Funktionelle Speiseröhren-Divertikel.*) *Wien. klin. Wchnschr.*, Nov. 18, 1926.

Bársony reports 2 cases of duodenal ulcer in which so-called "functional relaxation diverticula" were found. This type is found only

during the act of swallowing. The author calls attention to the fact that as a result of some organic disease in other parts of the gastrointestinal tract, there may arise segmental increase as well as decrease in the tonicity of the esophageal musculature. Where an area of segmental decrease in tonicity is found between two areas of segmental increase of tonicity, a relaxation, transitory diverticula may result. The author believes that this type may in time result in the formation of a true pulsion diverticulum.

HEINDL, ADALBERT. Early treatment of erosion of the esophagus. (*Frühbehandlung der Speiseröhrenverätzungen.*) *Wien. klin. Wchnschr.*, Oct. 28, 1926.

The author calls attention to the frequency with which chemical burns of the esophagus occur in his country because of the taking of caustic potash with suicidal intent. He reports on 18 adult cases seen since 1920. In all of these cases early passing of a bougie in the esophagus was undertaken with the idea of preventing stricture formation. The bougie can usually not be used before the expiration of two to three days after the swallowing of the chemical. Even at this time, the pain incident upon the passage of the instrument may be so intense as to require an opiate. In the opinion of the author this procedure leads not only to a decrease in the number of strictures but also brings about an earlier and more complete restoration of function in those cases that do not go on to stricture formation.

GREENOUGH, ROBERT B. Carcinoma of the breast. *Am. J. Roentgenol. & Rad. Therap.*, Nov., 1926, xvi, 439.

From a small series of cases, Greenough believes that the following conclusions are justified:

(1) Radical operation performed before the disease has extended widely offers the best expectation of cures for cancer of the breast.

(2) Pre-operative and postoperative irradiation with roentgen rays, as given at the Massachusetts General Hospital in 1918-1920, does not appear to have been of value as an adjunct to surgical operation.

(3) Nearly 30 per cent of all cases of cancer of the breast are of so malignant a character that with our present resources we are unable to cure the disease.

(4) The remaining 70 per cent of cases give

reasonable hope of cure by operation when the disease is not too far advanced.

(5) Education of the public and of the medical profession as well, to a better appreciation of the possible significance of all breast tumors, and to a more prompt application of treatment, may yet notably diminish the mortality of this disease.

(6) In the treatment of breast cancer, which is beyond hope of cure by operation, roentgen irradiation offers prospect of relief which can be obtained at present by no other means.

RAWLS, JULIAN L. The treatment of general peritonitis and allied conditions. *Virginia M. Monthly*, Dec., 1926, liii.

The plan of treatment recommended consists in withholding all fluids by mouth until the abdominal symptoms have subsided, this sometimes taking from a week to ten days; and giving subcutaneously, daily, from 1000 to 3000 c.c. of normal saline solution to which have been added 0.33 gms. of novocaine per 1000 c.c. to relieve pain. In the intestinal obstruction cases, where there is an increase in the urea content of the blood and a decrease in blood chlorides, the strength of the saline solution is frequently doubled, and with the novocaine this does not produce undue pain. Use frequent gastric lavage if there is any tendency to the accumulation of fluid in the stomach. Do not wait for the patient to vomit in these cases; if there is any suspicion of a retention of fluid in the stomach, anticipate the vomiting by the introduction of the tube. Frequently one obtains more than 1000 c.c. of offensive, yellowish material when the patient has not vomited at all. Lavage is a life-saver. If the vomiting is persistent or would require the frequent passing of a stomach tube, a duodenal tube is introduced into the stomach and fastened to the cheek with adhesive plaster. This drains into a basin and the stomach is washed out at frequent intervals through this tube with a soda bicarbonate solution. Give each day not less than 10 gms. of glucose intravenously. Rawls uses ampules of 10 gm. in 20 c.c. of water. The contents of the ampule are sucked up cold in a warm 20 c.c. syringe and the fluid without dilution is injected directly into the vein. He has had no trouble with it in any way.

The surgical condition in the abdomen, of course, is treated by the usual surgical means: that is the repair of perforations, the releasing

of obstruction, enterostomy when indicated, and the establishment of drainage. No case has been treated expectantly, although cases have been tided over a day or two under treatment until they became better risks. Rawls makes no attempt to flush out the abdomen. He has used suction to remove accumulations of fluid but no substance has been introduced into the abdominal cavity.

BUTLER, DELL D. Post-operative gas bacillus infection of the abdominal wall. *Ann. Surg.*, Dec., 1926, lxxxiv.

Butler records 2 cases and some of the literature. He concludes:

1. Postoperative gas bacillus infection of the abdominal wall is a very rare complication, but serious.

2. There is relatively little risk as gas producing anaerobes were not found in any cultures made.

3. Suspicion of such a complication should be aroused by a sudden increase in pulse rate, with or without a rise in temperature, in a patient who is not doing well after operation.

4. The diagnostic signs are copper-colored bronzing of the skin, with edema, brownish, foul-smelling discharge from the wound, crepitation, and positive bacteriological smears.

5. Treatment should be prompt multiple incisions and free drainage.

6. The prognosis depends upon the extent of the infection.

NEWBURGER, BERNHARD. Metastatic intramuscular gonococcal abscess. *Ann. Surg.*, Dec., 1926, lxxxiv.

Seven cases of probable but unproven gonococcal abscesses in muscle tissue are abstracted from the literature and a case due to a transient gonococcemia is presented with confirmatory bacteriological data.

SÉNÈQUE, J. Therapeutic indications in fistulae of the pancreas. (*Les indications thérapeutiques dans les fistules pancréatiques.*) *Presse Méd.*, Nov. 27, 1926.

Pancreatic fistulae may arise as a result of contusions of the abdomen, as a result of surgical traumata in the course of other operations or as one of the sequelae of an antecedent acute pancreatitis. In general, a long interval of time, about nine months, should elapse between the appearance of the fistula and the institution of surgical measures. During this period, con-

servative measures should be employed, such as the use of bicarbonate of soda, atropine and a rigid adherence to an antidiabetic diet. In those cases in which there is very little pancreatic juice excreted cauterization of the tract may help in closing the fistula. In other cases in which true pancreatic juice is excreted, the skin should be protected against autodigestion by vaselined gauze and the pancreatic fluid should be carefully siphoned and fed to the patient to prevent emaciation. Where the patient is rapidly losing ground as a result of the loss of a large amount of pancreatic fluid operation should be undertaken. The only operation offering hope of success is that in which the pancreatic fistula is dissected free and reimplanted into the stomach, the gall bladder or the small intestine.

EINHORN, MAX. Pancreatic tumors, malignant and benign. *Am. J. M. Sc.*, Dec., 1926, clxxii, 796.

Einhorn quotes Malley-Guy and reports 9 cases. In most of the patients the principal symptoms were loss of appetite (in some disgust for food) and more or less constant distress in the epigastric region with frequent eructations. Severe attacks of pain, especially in the left hypochondrium, radiating to the dorsal vertebra were met with. In a few patients the pain was more pronounced in recumbency, while relief was obtained in standing, sitting or lying on the right side.

In the malignant cases there is a gradual progression of the disease without any marked periods of intermission.

In the benign variety of chronic pancreatitis there are periods of suffering alternating with more or less prolonged intervals of euphoria.

The pancreatic juice almost always reveals a diminished activity and sometimes a complete lack of some of the ferments (this refers to a greater extent to the malignant conditions of the pancreas, especially when the malady is already advanced). The bile is usually turbid, containing cholesterol crystals and often pus corpuscles. The gastric contents frequently show achylia or a high degree of subacidity in the malignant cases and hyperchlorhydria or euclorhydria in the benign.

Jaundice is encountered in a number of these cases, principally when the head of the pancreas is especially involved. The diagnosis is then somewhat facilitated. In all the cases there was a chronic cholecystitis.

Surgical intervention is frequently practiced. Exploration sometimes helps to make a differential diagnosis.

Two cases of pancreatic tumors (due to simple inflammation) causing jaundice, with perfect recovery, one after simple biliary drainage and the other after cholecystogastrostomy, deserve special mention. In both the condition simulated malignant disease of the gall bladder or pancreas. If no operation had been done they would certainly have succumbed after great suffering.

MATEER, JOHN G., and HENDERSON, W. STUART. Chronic biliary tract disease. *Arch. Int. Med.*, Dec. 15, 1926, xxxviii.

This study is mainly based on a detailed analysis of the diagnostic findings in ninety-four consecutive operated patients with chronic gall tract disease.

Recent pathological studies indicate that chronic gall tract disease involves not only a chronic cholecystitis but also a chronic interstitial hepatitis and a chronic cholangitis with dilatation of the larger extrahepatic bile ducts. The relative involvement of the gall bladder, bile ducts and liver varies greatly in the individual case, making it desirable to use various methods of diagnosis to obtain information regarding the involvement of these three parts of the biliary tree.

The history affords most valuable evidence for the presence of gall tract disease. It is indispensable to a correct functional diagnosis and a proper evaluation of the gastrointestinal symptoms. This is especially important in patients who have evidence of several pathological conditions in the gastrointestinal tract.

The physical examination aids greatly in the differential diagnosis from irritable colon, chronic appendicitis, renal disease, etc.

Cholecystography affords reliable information in a high percentage of cases, and has greatly refined gall-bladder diagnosis. The oral administration of the dye is unobjectionable, and also reliable, if a proper and uniform technique is followed. Other roentgen-ray methods are still of value in a smaller percentage of cases, and should be used in conjunction with cholecystography.

Duodenobiliary drainage affords important direct evidence of chronic cholangitis, and valuable indirect evidence of cholecystitis, in the finding of bile-stained clumps of pus cells and bile-stained colonies of bacteria, frequently

in association with bile-duct epithelium. Showers of clumped crystals in the bile strongly suggest gallstones.

By utilizing biliary drainage to determine the earliest stages of bile duct infection and inflammation, cholecystography to ascertain the pathologic physiology and anatomy of the gall bladder, and a serum bilirubin determination to gain some idea relative to the liver involvement, the diagnosis of early gall tract disease, suspected on the basis of clinical symptoms, can be confirmed and refined.

WANGENSTEEN, OWEN H. Should the gall-bladder be removed without drainage? *Ann. Surg.*, Dec., 1926, lxxxiv.

Wangensteen reports a case and experiences of others, and concludes that the so-called "ideal cholecystectomy" is not a safe procedure. An instance of its practice in which drainage was omitted is cited, the outcome of which was favorable following the spontaneous escape of a large quantity of bile through the abdominal incision. Numerous instances are reported where relaparotomy was necessary because of bile leakage when drainage was omitted. A still greater number died because of the escape of bile and the failure to drain. The leakage of bile may be early or delayed. That occurring soon after removal of the gall bladder is due to injury to the liver bed or severance of small aberrant bile ducts. The delayed escape of bile is occasioned by insufficiency of cystic duct occlusion. Drainage after cholecystectomy is imperative. It is a safeguard and does no harm.

DELORE, X., MALLET-GUY, P., and BURLET, J. Late results after gastric resection for carcinoma. (*Suites éloignées de la résection gastrique pour cancer.*) *Presse Méd.*, Oct. 6, 1926.

Of 130 cases operated upon for gastric carcinoma, 88 were carefully followed. The authors have considered those alive after three years as definitely cured. They obtained only 16 per cent of such cures. Practically all of the cases showed a period of temporary cure lasting on an average about eighteen months. Thereafter the patients usually began to complain of various gastric troubles, icterus, ascites and pain, which were considered as signs of recurrence. The authors show that the occurrence of a pyloric stenosis is to be considered a favorable early sign rather than as of bad prognostic



significance and that the apparent involvement of lymph nodes bears no relation to the time or the likelihood of recurrence. The demonstration of the presence of a colloid carcinoma, as against any other type of cancer, decreases the outlook for ultimate cure by almost half.

PALMER, WALTER LINCOLN. The mechanism of pain in gastric and in duodenal ulcer. *Arch. Int. Med.*, Dec. 15, 1926, xxxviii.

Palmer finds that:

1. Typical ulcer distress can be initiated in ulcer patients under suitable conditions by: (a) the reinjection of the gruel obtained at the time of distress, (b) solutions of hydrochloric acid of similar concentrations (and therefore entirely physiological) or by stronger solutions, (c) solutions of sulphuric and acetic acids and of sodium hydroxide.

2. Such distress is not produced in normal stomachs by similar injections.

3. Distress so produced is relieved by neutralization of the chemical irritant, or by partial removal of the irritant and neutralization of the remainder.

4. Hydrochloric acid is the irritant normally present in the gastric content which constitutes an adequate stimulus to the pain-producing mechanism of a sensitive peptic ulcer.

5. The distress of gastric carcinoma can be similarly induced at times.

6. The distress typical of the other abdominal conditions studied has not been induced by acid injections up to the present time, or, if already present, it has not been altered by them.

7. No evidence has been obtained of hyperesthesia of the gastric mucous membrane, or of pain as the result of hyperchlorhydria with an intact gastric and duodenal mucosa.

CHENUT, A. Experiments in mechanical intestinal obstruction of the jejunum and ileum. (*L'expérimentation dans l'occlusion mécanique du jeuno-iléon.*) *Rev. de chir.*, 1926, xlv, No. 7, 474.

The author has performed a great number of experiments on dogs for the purpose of studying mechanical occlusion of the small intestine. In brief, he comes to the conclusion that the prime factor in determining the survival or death of the patient suffering with intestinal occlusion is the viability of the intestine. Any interference with this predisposes to the development of peritonitis. Early operation is

advised. The author calls attention, however, to the fact that "early" is a relative term. What may appear early in one case might be entirely too late in another apparently similar case. A number of different criteria have been described for determining the state of the gut but all appear to be difficult of application in a routine manner. In general, the attitude to be adopted is wide resection of the involved loop of gut when the condition of the patient warrants and otherwise exteriorization of the loop until such time as the condition permits further operative procedures.

COLP, RALPH. External fecal fistulae in acute appendicitis. *Ann. Surg.*, Dec., 1926, lxxxiv.

In 2841 consecutive cases of acute appendicitis 1.1 per cent developed fecal fistulae. These are most frequently seen in cases of acute gangrenous appendicitis and abscess. Rough surgical manipulation and improper drainage materials contribute to their formation. The incidence of appendiceal fecal fistulae appears less with the "simple drop" method than with the inversion of the appendix stump.

When fecal fistulae are once established drainage tubes should be shortened or removed if feasible, or ones of smaller caliber should be substituted. The great majority of fecal fistulae of appendiceal origin will heal spontaneously if treated conservatively. In this series only 12 per cent were subjected to surgical interference.

BENDIXEN, P. A., and LAMB, F. H. Malignant tumors of the adrenal in children. With report of a case. *J. Lab. & Clin. Med.*, Nov., 1926, xii.

From their case study and the literature the authors conclude:

1. Suprarenal medullary malignancy is not an altogether unusual occurrence.

2. In the majority of cases an orbital hemorrhage is the first sign observed, and it may occur before any tumor is palpable.

3. The orbit first involved is often on the same side as the primary tumor.

4. Diagnosis should not be difficult once the orbital hemorrhage has occurred; the disease is likely to be mistaken only for trauma, chloroma and scurvy.

5. Surgical interference can be of no avail, except as a palliative to drain a pyonephrosis or to meet other complications, as the metas-



tases occur usually before a diagnosis can be made.

6. Metastases probably occur via the lymph stream.

7. The malignancy rarely metastasizes to the skin.

8. The medulla of the suprarenal gland being neuroectodermic in origin, these malignant tumors are similar in their histological structure to malignant neoplasms of the sympathetic nervous system, and they are correctly designated as neuroblastoma.

BURDICK, CARL GOODWIN, and COLEY, BRADLEY L. Abnormal descent of the testicle. *Ann. Surg.*, Dec., 1926, lxxxiv.

In practically all cases of undescended testicle there is a patent funicular process in which a definite hernia is almost certain to develop in later years. Any testicle that does not lie in its normal position is more subject to trauma and more liable to malignant degeneration. Statistics show that the incidence of malignant changes is fifty times greater in the imperfectly descended testicle. Every growing boy is prone to an inferiority complex which may prey upon his mind if his testicles are not normally situated.

The chief value of the imperfectly descended testicle lies in its internal secretory function, and for this reason castration is not to be recommended and should never be performed in cases of double maldescent.

A thorough understanding of the fascial planes of the groin is essential to be sure that the testicle is placed in its proper position. In this series Burdick and Coley found 9 cases after operation in which examination revealed the testicle in the thigh rather than in the scrotum. Faulty direction of the gubernaculum is the usual cause of this error.

The activity of the cremasteric reflex should always be borne in mind in examining patients suspected of having an undescended testicle.

The ideal age for operative interference is between eight and twelve years. The presence of a large hernia is an indication at any age since a truss should never be worn.

Prognosis should be especially guarded in individuals of either the Froelich type of hypopituitary adiposity or the clinical type of hypogonadism.

In a series of 537 operations, satisfactory results as to the location of the testis were obtained in about 50 per cent. As regards the

size of the testicle, satisfactory results were obtained in about 15 per cent. Except in rare instances an atrophic testicle when placed in the scrotum does not continue to develop normally.

MEKIE, ERIC C. Parasitic infection of the urinary tract. Report of a case of infection of the urinary tract by acari, together with an analysis of previously reported cases. *Edin. M. J.*, Dec., 1926, xxxiii.

Mekie reports an interesting case and discusses the literature of this rare type of urinary tract infection. If the urinary tract becomes infected by members of the arachnida species, the result is a clinical picture suggesting irritation of the tract, and one of the commonest symptoms is nocturnal enuresis. The urine frequently contains large sheets of epithelial cells. The presence of acari in the urine can be assumed to indicate true endoparasitism only in those cases in which they are found repeatedly and when precautions have been taken against contamination. A secondary micro-organismal infection of the urinary tract is liable to occur.

HELMHOLZ, HENRY F. Neuromuscular dysfunction of the bladder as a cause of chronic pyelitis in childhood. *Am. J. Dis. Child.*, Nov., 1926, xxxii.

Fifteen cases of neuromuscular dysfunction of the bladder in children, whose ages range from a few days to fourteen years, are reported. Ten of the cases are of the cord-bladder type, 4 of the atonic type, and in 1 there was complete relaxation of the bladder sphincter. The prognosis in such cases is poor and treatment is difficult. Spina bifida occulta was found in 6 cases, but it is difficult to evaluate its relationship. Treatment of the complicating infection, chronic pyelitis and cystitis by the usual methods is practically always unsuccessful. Development of surgical methods of relief offers the only hope.

SAHLER, JOSEF. Dysmenorrhea and its treatment. (*Dysmenorrhoe und ihre Behandlung.*) *Wien. klin. Wchnschr.*, Nov. 25, 1926.

In his work at the gynecologic clinic of the University of Vienna Sahler has for many years been giving roentgenotherapy to women suffering with all manner of ovarian disturbance. The results have been especially good in those cases of headache associated with or occurring

shortly after the menopause. In the present communication, he reports on 72 cases of dysmenorrhea treated by exposing the pituitary body to the roentgen ray. The hair is protected by means of lead plates and the pituitary is rayed through two temporal fields about 4 cm. wide. The dose consists of about  $\frac{1}{8}$  to  $\frac{1}{2}$  H.E.D. In explaining the rationale of this procedure, Sahler calls attention to the close relationship between the function of the pituitary and that of the ovary.

COLEY, WILLIAM B., and COLEY, BRADLEY L.  
Primary malignant tumors of the long bones. End-results in one hundred and seventy operable cases, including a small group of malignant central sarcoma. *Arch. Surg.*, Dec. 1926, xiii.

This is a very long article of which only the first portion has appeared. In it the authors conclude:

1. The prognosis of osteogenic sarcoma of the long bones, while far from satisfactory, is by no means as hopeless as is generally believed by physicians.

2. The prognosis depends largely on an early diagnosis and the exercise of most careful judgment in selecting the method of treatment for the individual cases; this should be based on a wide experience with a great variety of clinical and pathological types of bone sarcoma.

3. Amputation alone offers little hope of a permanent cure in any of these types.

4. Primary treatment with radium or roentgen rays, even if pushed to the utmost limits of safety, while often causing very marked improvement has thus far failed to effect a permanent cure in any case in which the diagnosis has been unquestionably established by clinical and pathological evidence.

5. The mixed toxins of erysipelas and *Bacillus prodigiosus* alone have effected a cure in a certain number of cases; but all of these cases have been of the round cell or spindle cell type, characterized by little production of new bone.

6. The mixed toxins and radium combined have likewise resulted in the complete disappearance and apparent cure of an even larger number of cases of a similar type; but neither toxins nor radium, singly or combined, have effected a cure in any case associated with marked new bone production.

7. Amputation followed by prolonged treatment with the mixed toxins in a series of 38 consecutive cases shows 50 per cent of the

patients alive and well from three to eighteen years. This series includes all types of osteogenic sarcoma, as well as the cases associated with marked new bone formation.

8. In a similar series of cases treated by amputation alone without toxins or radium before or after amputation, not a single patient has remained alive beyond the three-year period.

9. The choice of treatment in a given case depends on whether it belongs to the group of round cell sarcoma (endothelioma, according to Ewing's classification) or to the group associated with marked new bone formation. If to the first group, the authors believe it is safe to try a combination of the systemic effect of toxins and the local effect of radium, the duration of the treatment to depend on the result obtained; if marked improvement is noted, the treatment may be continued until the tumor has entirely disappeared; but if no improvement is noted in from four to six weeks amputation should be performed, followed by prolonged systemic toxin treatment.

If the case belongs in the second group, the authors see no advantage, but a distinct disadvantage, in preliminary treatment with radium, roentgen rays or toxins, for the reason that metastases may develop during the period of treatment or may be hastened by the rapid breaking down of a vascular tumor, which permits living cells to be carried to the lungs or to remote parts of the body. Since their experience, supported by the results of other men, shows that there is no reasonable hope of saving the limb in this group of cases, the authors believe that amputation at the earliest possible moment followed by prophylactic toxin treatment offers the greatest hope of saving the life of the patient.

10. The fact that 10 inoperable cases of this series have been successfully treated with the mixed toxins alone or combined with radium, the patients remaining well from five to twenty-four years later, should prevent the abandoning of all hope in cases beyond surgical relief.

GOFORTH, J. L. Giant cell tumor of bone. *Arch. Surg.*, Dec., 1926, xiii.

Goforth summarizes:

1. The known behavior of the giant cell tumor warrants its being classified as a true neoplasm.

2. The giant cell tumors constitute a series. Those at the lower end of the scale possess

relatively adult fibrous stromas and are essentially benign. They exhibit more cellular and active stromas, composed chiefly of relatively immature fibroblastic cells, and become increasingly more locally aggressive as the scale is ascended.

3. Under the stimulus of inadequate or improper treatment, they may recur locally, those at the upper end of the scale being especially liable to this tendency. Such recurrences, as a rule, are more aggressive or virulent than the primary growth, both clinically and microscopically.

4. They are potentially malignant and may as a result of repeated or improper treatment excitation on rare occasions undergo malignant transformation and metastasize.

5. The giant cells, or osteoclasts that are characteristically present, function as bone absorbers, and are of osteoblastic origin. They are not reliable indexes of the neoplasm's relative malignancy.

6. The stroma is of fibroblastic origin and its behavior governs the course of the giant cell tumor. Thorough microscopical study of its cellularity, cell type and cell activity offers a fairly reliable criterion of the innocence or relative malignancy of the growth.

7. History, thorough clinical and roentgen-ray study, macroscopical and critical microscopical analysis, and a rigid follow-up are all necessary in establishing the final correct diagnosis and the true nature and behavior of the giant cell tumor.

STEINMANN. Fracture surgery. *Internat. Clin.* Dec., 1926, S. 36, iv.

*Meniscus Injuries.* On the basis of about 200 meniscus operations, Steinmann states:

(1) In 63 per cent of the cases there is meniscus bipartitus (Steinmann), that is to say, a longitudinal tear, which separates the inner limb from the marginal limb, so that both remain in continuity anteriorly and posteriorly.

In 27 per cent of the cases, a fragment is torn away and hangs to the meniscus by a stalk.

Ten per cent of the cases consist of a tearing away of one or both ends, transverse tears and crushings.

(2) Injury of the medial meniscus is about twelve times as frequent as is that of the lateral meniscus.

(3) Injury of the medial meniscus occurs through sudden closure of the joint following sudden contraction of the thigh musculature with the leg flexed and rotated outward. The meniscus stretched like a bowstring in the joint cavity through external rotation is thus caught between the two internal condyles of the tibia and femur and cracked or torn, since it is pulled out of place by the tensed capsule, owing to the contraction of the vastus.

(4) The event may indeed take place without external influence.

(5) The most constant symptom is that of pain upon the external rotation of the flexed leg, which I first suggested.

(6) The sensitive swelling, often palpable on the joint line, is composed of a subsequent inflammation of the capsule and not of a luxation or subluxation of this to the outside.

(7) The roentgen-ray picture reveals no findings in meniscus injury, and serves merely for the exclusion of other affections considered in the differential diagnosis (arthritis deformans, injuries of the crucial ligaments).

(8) The incarceration of an alar synovial fat lobule in Hoffa's disease cannot be surely differentiated from meniscus injury and is only determined at operation, which is indicated for both conditions.

(9) Recurrent or chronic occurrences of locking are absolute indications for operation.

(10) Operation, with leg hanging at a right angle: Transverse incision through the skin. Smaller longitudinal incision through the fascia and joint capsule. Section of the internal limb at the anterior end with a scalpel. Section of the posterior end or of the stalk of a fragment with the especially devised Steinmann's meniscotome.

(11) After-treatment with immediate active movement and after some days of massage. Average stay in bed, nine days. Average time in hospital, sixteen days. After seven weeks, on an average, complete fitness for work. All patients became subsequently completely able for work.

*Some New Surgical Procedures:* (1) Temporary percutaneous nailing through driving in of a hollowed-out nail by means of a peg inserted into the cavity. The procedure may serve for the fastening of easily accessible fragments and for the retention of certain dislocations, e.g., those of the clavicle at both ends.

(2) Prevention of recurrent dislocation re-

sulting from torn ligaments of the acromioclavicular joint by means of a bony and periosteal flap reflected from the clavicle.

(3) Operation for habitual dislocation of the shoulder by means of a bone and periosteal chip, which is fastened to the anterior side of the scapula and overhangs the glenoid cavity about 1 to  $1\frac{1}{2}$  cm. Up to now no recurrence and complete function.

(4) Strengthening of the torn patellar ligament by means of wire loops through the patella and tuberosity of the tibia, to make possible the immediate active movement of the joint. Thereby rapid recovery of normal function.

(5) Operative setting of an angular healed fracture, especially of the tibia, without shortening by means of transverse osteotomy and insertion of a bony wedge obtained from the callus.

(6) Restoration of the transverse arch in flat-foot by means of a bolt perforating the first and fifth metatarsals and holding them together with two bolts. Definite bony fixation of the restored arch by means of subperiosteally implanted periosteal flaps. Very good result.

(7) Lengthening of an old fracture or of a congenital disturbance of growth resulting in shortened bones, by means of a screw splint with nail extension after oblique osteotomy, finally also transplantation of periosteum and bone.

#### SUPPLEMENTARY ABSTRACTS ON ROENTGENOGRAPHY AND RADIUM THERAPY

ABEL, A. LAWRENCE. The treatment of cancer of the esophagus. *Brit. J. Surg.*, July, 1926, xiv, 131-159.

Cancer of the esophagus gives early symptoms and remains localized to the affected organ long after its presence can be definitely diagnosed. Moreover glandular metastases from carcinoma of the esophagus are the exception rather than the rule and the majority of sufferers from this complaint do not die from carcinoma but from starvation. Consequently this type of cancer is and almost always should be diagnosed at a very early date. It is the author's opinion that the only adequate form of treatment is surgical removal. Complete freedom from local recurrence should follow the operation, and late glandular recurrence should occur only in a minority of the cases. The details of the various types of operation are

given. Radium, roentgen rays and diathermy are of very little value in the treatment of the disease except where palliation is intended.

The diagnosis can be easily established in the physical examination. Roentgenoscopy in the oblique position is preferred to roentgenography as a means of securing the necessary information. Even when no stenosis is present the roentgenogram may show retention of a small portion of the opaque substance at the site of an early lesion. If only slight stenosis is present no arrest of contrast fluid is seen, but a slight diminution in the caliber of the tube may be indicated. In the typical picture the barium passes through a malignant stricture and shows an irregularity at its lower extremity (rat tail like appearance). If it is proposed to treat the case with radium, it is essential that the total length of the malignant stricture be accurately determined. For this purpose retrograde roentgenography is employed. This is done by placing the patient in a slight Trendelenburg position, and the roentgenogram is taken while he is swallowing a fairly thick mixture of the contrast material; or it may be sufficient to have the patient lying horizontally with the right shoulder on the table and the negative placed against the posterior part of the left shoulder.

Esophagoscopy is of extreme importance especially in the earlier stages of the disease in order to establish an accurate diagnosis. In skilled hands this procedure is almost devoid of danger.

ANDREI, ORESTE. To what extent is it possible to tell the age of a fracture from the roentgen picture? *Chir. d. org. di movimento*, February, 1926, x, 255-293.

This question came up in connection with a medico-legal case in which a man claimed damages for a fracture sustained in an injury. Roentgen examination showed a healed fracture that must have dated from a time long before the accident. As a result of this incident Andrei made a study of a large number of cases of fracture and presents brief notes of them together with roentgenograms at different stages. He concludes that in simple fractures of the diaphysis without displacement of the fragments the first change that can be seen is a blunting of the edges and angles of the broken bone, which becomes visible at the end of the second week. The callus begins to appear between the sixteenth and twentieth days after the trauma; it is clearly defined from the third to the fourth month and regains the opacity of normal bone between the eighth and tenth months after the trauma. Within the first year after the fracture the bone does not

have a lamellar structure. Reconstruction of the system of lamellae begins in the thirteenth to fourteenth month and is well advanced at the end of the second year. The fracture line disappears between the sixth and eighth month after the trauma but later becomes evident again as a line of greater opacity in the bone. At the end of the second year, although the callus is greatly reduced, a trace of it can still be seen in the form of a thin and very opaque layer in the compact tissue of the bone.

In fractures of the diaphysis with displacement of the fragments the blunting of the margins and angles appears at the end of the second week and the callus becomes visible in the third or fourth week. It becomes demarcated from the neighboring tissues later than in the other fractures, that is during the sixth or seventh months, and at the same time takes on the opacity of normal bone. It is not absorbed so well as in fractures that have been well reduced and a definite time for the reconstruction of normal bone structure cannot be set.

In fractures of the phalanges, metacarpals and metatarsals there is a blunting of the margins and angles of the bone at the end of the first week. Within a little while afterwards, generally at the end of the third week and sometimes as early as the beginning of the second, the callus appears in the form of a delicate white cloud. At the end of the fourth month it is clearly defined and toward the sixth or seventh month it has the opacity of normal bone. During the first year the bone does not have a lamellar structure; this structure appears in the thirteenth or fourteenth month and is more or less advanced at the end of the second year. The fracture line disappears between the sixth and eighth month but becomes evident again later as a bone cicatrix.

**BUONSANTI, PAOLO.** The influence of surgical diseases on the development of the centers of ossification. *Cbir. d. org. d. movimento*, December, 1925, x, 61-82.

In order to study the effect of various surgical diseases on the development of the bones the author made roentgenograms of the carpus in normal individuals and in patients with various surgical diseases, including tuberculosis of glands and of bones other than those of the carpus, acute inflammatory diseases, constitutional diseases, tumors and congenital and acquired deformities. The roentgenograms show that even in normal individuals there is great variability in the time at which the centers of ossification of the bones of the carpus appear. The time of their appearance varies as much as one to three years. They appear earlier in girls than in boys.

The various diseases studied did not appear to have any effect on the time of development of the centers, not even in a case of chronic suppuration from osteomyelitis in which the general condition was seriously affected. Apparently surgical diseases do not affect the organs which stimulate growth of bone. The practical surgical application of this fact is that the surgeon may prolong repeated bandaging and immobilizing treatment in diseases which require it, such as tuberculosis of bones and various orthopedic conditions, without any fear of damaging the development of the centers of ossification.

**BURRELL, L. S. T.** The diagnosis and treatment of intrathoracic new growths. *Lancet, Lond.*, Feb. 27, 1926, i, 435-436.

No time should be lost in confirming the diagnosis of intrathoracic new growths; and when once it is confirmed the surgeon should be called in and time should not be wasted in trying radium or any other form of treatment. It is emphasized that non-malignant growths such as a dermoid or fibroma often prove fatal if ignored too long. The roentgen rays in the diagnosis of these conditions are very valuable. The injection of lipiodol or the induction of a pneumothorax may assist considerably in the roentgenographic diagnosis.

In the author's experience, roentgen therapy is very good in cases of lymphadenoma and sarcoma and should always be used. For other forms of intrathoracic growth, roentgen-ray and radium therapy were found disappointing; but they should be tried in cases which are inoperable. When operation is possible, it should be tried first. Syphilis must be carefully excluded before a final diagnosis is established.

**BUSTOS, FERNANDO M.** Sacralization of the fifth lumbar vertebra. *Semana med., Buenos Aires*, Jan. 21, 1926, xxxiii, 144-154.

This condition was first described in 1888 but it has only recently been found to be the cause of some painful conditions which have heretofore been diagnosed as sciatica or lumbalgia. In the first degree of the affection there is only increase in size of one or both transverse processes of the fifth lumbar vertebra; in the second they are increased until they come in contact with the sacrum, but there is no joint formed; in the third the process is very large and is connected with the wing of the sacrum by a true joint, in the fourth the process enters into relation with both the sacrum and the ilium; in the fifth there is a true synostosis between the transverse process and the sacrum, and in the sixth the synostosis includes the body of the vertebra also and may be called a

complete sacralization. Most authors say that there must be contact with the sacrum to constitute sacralization and that the first degree given above should therefore not be counted, but it sometimes causes the same painful syndrome as a true sacralization and may be called a pseudo-sacralization. Different degrees of sacralization may exist on the two sides. Anatomic sacralization sometimes exists without causing any symptoms.

The pain syndrome appears most frequently in men between twenty and forty years of age and is generally diagnosed as sciatica or lumbalgia. Physical examination often shows that the vertebral column has lost its normal lordosis and is straight; and there may be scoliosis of different degrees, crossed or homologous. Differential diagnosis from tuberculous spondylitis, spondylolisthesis and traumatic spondylitis may be made by roentgen examination. A valuable method of differentiation from sciaticas not caused by sacralization is to inject a local anesthetic to determine the segment from which the lesion originates. The roentgen picture may be confused in some cases by superimposed shadows. The fifth lumbar vertebra may be more or less wedged into the interiliac space and the shadows of the transverse processes, the highest part of the wing of the sacrum and the highest part of the ilium may be superimposed.

The condition is probably due to atavism. In examining the skeletons of anthropoid apes the author found that they have a symmetrical and bilateral fusion of the fifth lumbar with the sacrum, and in the South American natives there is often such a sacralization also.

There may be an infectious or traumatic element added to the sacralization in the causation of the pain syndrome and treatment for that should first be given. If medical and roentgen treatment are not effective, the transverse process or processes should be resected.

DILLINGHAM, FREDERICK H., AND MCCAFFERTY, LAWRENCE K. Bone syphilis. *Am. J. Syph.*, July, 1926, x, 373-382.

Three cases are reported; one of early periostitis, one of the thickening of the periosteum with osteoporosis of the bone cortex, and one of extensive osteomyelitis with thickening of the bone cortex and elevation of the periosteum.

When syphilis of the bone exists for any length of time there is present not only periostitis but at the same time various phases of bone pathology such as sclerosis, rarefaction and osteomyelitis. It is only in the beginning of bone syphilis that one sees the wavy, irregular

line of the periosteum in the roentgenogram, which almost always signifies syphilitic periostitis. This picture is seen so frequently, that sight may be lost of the fact that syphilis may also cause the other definite lesions mentioned above.

One should be on the lookout for syphilis at the first sign of nocturnal pain. One should not treat too lightly the "aches and pains" of middle life, but should attempt to assign a definite cause rather than to classify them all under neurasthenia, rheumatism, etc. A roentgenogram should always follow a negative Wassermann reaction in cases presenting persistent nocturnal pains whether or not the history is suggestive of syphilis. The roentgenologist may not be able always to definitely differentiate bone syphilis from tuberculosis and other diseases of bone, but he can frequently aid the syphilologist in arriving at a tentative diagnosis. At times it may be necessary to resort to the therapeutic test, but this is infrequent.

EADES, M. F. Postoperative massive atelectasis. *Boston M. & S. J.*, Aug. 5, 1926, cxcv, 258-263.

Postoperative massive atelectasis is a frequently unrecognized pulmonary complication. The diagnosis is important in order to eliminate more serious conditions with which it may be confused. The cardinal clinical sign is displacement of the heart toward the affected side. In the involvement of the right lung, the cardiac impulse is frequently found at the left border of the sternum. If the left lung is affected the cardiac impulse may be found on the left anterior or mid-axillary line. The position of the heart should be verified roentgenographically in all suspected cases. This is especially important in the recognition of cases in which the lung involvement and the cardiac displacement are slight. In extensive involvement the affected lung shows a remarkable degree of uniform density comparable in some instances to that of the cardiac shadow. In some cases a definite deviation of the trachea toward the affected side is also evident. The roentgenogram may be the only means of differentiating this condition from embolism or infarct, owing to the varying degrees of the clinical signs and symptoms.

It is believed that bronchial obstruction and weakened respiratory movement in varying combinations produce postoperative massive atelectasis. The prognosis in cases of unilateral collapse is excellent; in bilateral involvement the outcome is liable to be fatal. No treatment has been found which influences the course of the condition.



GIAUME, CESARE. The etiology and pathogenesis of achondroplasia. *Pediatrics*, April, 1926, xxxiv, 359-369.

A child thirty months of age had had an abnormally large head and short limbs at birth. In the early months of his life his head continued to develop rapidly and he was given a mercurial treatment with good results. The child himself has a one plus Wassermann reaction, while the father's reaction was 2 plus and that of the mother 3 plus. Roentgen examination showed exaggerated development of the vault of the cranium as compared with the face and the base. The bones were very thin, especially in the fronto-parietal region. The fronto-parietal suture was more prominent than the others. Because of technical difficulties the picture of the base was not clear enough so that the structure of the sella turcica could be determined accurately. The diaphyses of all the bones of the limbs were shorter than normal. There was no marked abnormality in their structure. In the arms the proximal and distal ends of the diaphyses were clearly visible but the epiphyses were not visible. The distal extremity of the ulna did not reach to the wrist joint. The radius was curved; the 4th metacarpal was shortened. In the legs the upper and lower ends of the diaphyses were clearly visible, but they were pointed. The distal and proximal epiphyses of the tibia were visible; the articular cartilages were somewhat smaller than normal; slight dorso-lumbar kyphosis and lumbar lordosis with marked forward inclination of the pelvis. No apparent change in the structure of the vertebrae. The lower limbs were 12 cm. shorter than normal while the arms were shortened only 1.5 cm. The proportion between the tibia and femur was almost normal while the radius was longer than normal in proportion to the humerus.

In addition to the classical signs of achondroplasia there were also some signs indicating rickets, such as the macrocephalia and the ogival form of the palate; also the enlargement of the thorax at the base and the costal rosary. But fetal dystrophy may extend to the bones of the trunk also. Possibly the two diseases coexisted in this case.

The syphilis was undoubtedly the cause of the disease in this case, though it may be produced by any toxi-infection acting on the fetus between the 4th and 6th weeks of development.

GIORDANO, D. Aneurysm of the abdominal aorta with gastric symptoms. Introduction of silver-plated wire into the sac of the aneurysm. *Ann. ital. d. chir.*, 1926, v, 125.

A man of forty-nine was sent to the hospital Dec. 13, 1923, for suspected tumor of the lesser

curvature of the stomach. Fifteen years before he had contracted syphilis, for which calomel injections were given for a month, when he withdrew from treatment as he felt well. About seven years ago he began to have burning pain in the stomach, beginning about two hours after meals and lasting for an hour or two. Two years ago he lost 2 kilograms in weight and in addition to the burning sensation a feeling of weight in the epigastrium developed after meals, with pain lasting for one or two hours; acid cructation, constipation. For the past five months he had had epigastric pain radiating to the back. Roentgenoscopy showed a large defect in the lesser curvature which was assumed to be due to tumor. On examination he was found poorly nourished, with a clayey pallor and fetid breath from dental caries. Abdomen rather rigid with pain in the epigastric region, most intense in the midline beneath the ensiform process. The rigidity of the muscles made examination difficult but a tumor could be felt with an arterial pulsation which was thought to be transmitted. Roentgenographic examination showed the stomach large with a tendency to hypotonia; there was deformity of the shadow of the pylorus and antrum where pressure was painful.

Epigastric incision showed a pulsating retrogastric tumor the size of a fist, very evidently an aneurysm of the subdiaphragmatic aorta. A small copper wire plated with silver was passed into the aneurysm through a large syringe needle; 30 cm. of the wire was used. It was kept coiled, and coiled again in the aneurysm. Five c.c. coagulen was injected into the tissue around the aneurysm and the bleeding stopped. Uneventful recovery followed by intravenous injection of an arsenobenzol compound and intramuscular injection of calomel. A month after the operation roentgen examination showed that the end of the wire had uncoiled and risen in the aorta from the level of the 2d lumbar vertebra to the level of the 7th dorsal. Another examination after fifteen days showed the wire in the same position, and a semilunar segment of the lower and anterior part of the aneurysm appeared more opaque, as if from stratified clots adherent to the wall. As the patient felt well and was relieved of all his gastric symptoms he left the hospital and refused to return for further injections.

He was brought back May 12, 1925, by one of the nurses who was interested in the case. He had put on weight, his color was good and he felt well. Epigastric palpation still showed pulsation from behind forward, but no lateral expansion. Roentgenoscopic examination showed no expansion of the tumor. Roentgenographic examination showed that the

upper part of the wire had broken off and risen in the aorta, where it curved with the arch.

It is hard to say whether the improvement in this case was due to the introduction of the wire into the aneurysm or to the antisiphilitic treatment, but as it began immediately after the operation the author thinks it was due partly at least to that. The presence of the broken wire in the aorta is a cause for serious anxiety.

A recent article in the *British Journal of Surgery* reviews 3 similar operations; one of the patients died eight and a half months after the operation, the others within a few days. The authors advise gastroenterostomy after the insertion of the wire into an aneurysm for fear of acute dilatation of the stomach from pressure on the pyloric or prepyloric region. But in this case the operation not only did not cause any stomach symptoms but relieved those which already existed. It is hard to say whether this relief was due to the decreased expansion of the aneurysmal sac or to the section of sympathetic fibers in exposing the sac above the lesser curvature.

**GUILLEMIN, A.** Roentgenoseopic diagnosis of gastrointestinal perforations: spontaneous pneumoperitoneum. *Arch. franco-belges de chir.*, August, 1925, xxviii, 684-702.

Sometimes the symptoms of a gastrointestinal perforation are so indefinite that diagnosis is difficult. Even as expert a gastrointestinal surgeon as Moynihan made an incision in the right iliac fossa in 18 out of 49 cases on a mistaken diagnosis of appendicitis. Guillemin describes 2 cases, one of violent abdominal pain in pneumonia and one of ruptured tubal pregnancy in which the symptoms were those of perforated gastroduodenal ulcer, and on the other hand, one in which the symptoms of a real perforation were so slight that the diagnosis was not made and the patient died.

In 1916 Lenk first used roentgen examination to diagnose perforations of the intestinal tract by bullets. He demonstrated a spontaneous pneumoperitoneum; the intestinal gas had accumulated between the liver and diaphragm which were pushed apart. A number of other authors have since used it in perforation of gastroduodenal ulcers and typhoid perforations of the intestine. Vaughan and Brams demonstrated free air in the peritoneal cavity in 13 out of 15, or 86.7 per cent of cases of typhoid perforation.

The author has made a systematic examination of all the patients who entered his hospital with signs of gastrointestinal perforation during the past year. He was able to make a diagnosis of perforation in 7 cases, 4 of perforation

of gastroduodenal ulcer, 2 of perforated appendicitis and one of bullet wound. The tendency of the gas is to rise to the highest point so that if the perforation is above the mesocolon the gas will rise and collect between the liver and the right side of the diaphragm; the diaphragm will be immobile. But if the perforation is below the mesocolon the gas will strike the barrier of the omentum and transverse mesocolon and push them up. In low or appendicular perforation the gas may pass along the colon and accumulate under the diaphragm. If there are adhesions the gas may be encysted locally.

The method is a valuable aid in cases which are doubtful clinically. Its value is not absolute for a small accumulation of gas in a case with early adhesions may not be seen; but in that case, the perforation being covered, there is no great danger to the patient. In perforated gangrenous appendicitis there may be a question as to whether the gas is from a perforation or has been produced by anaerobic bacteria. The objection has been urged that it delays operation and that the patient may be injured by the change of position necessary for the examination. But an early diagnosis is a necessary preliminary to early operation and the making of an exact diagnosis by means of roentgenoseopy may hasten, rather than delay operation. The patient can be examined in a semi-reclining position and there is very little danger of breaking adhesions or of disseminating the infection.

**HEUSER, CARLOS.** Air in the bladder. Roentgenographic explanation of how it may cause death. *Semana med.*, Buenos Aires, Jan. 28, 1926, xxxiii, 214-217.

So far the author has not had a case of death from insufflation of air into the bladder but he has had a case which explains how it may occur. He injected air in a case of suspected tumor of the bladder in which cystoscopy could not be performed on account of stricture. Some of the air escaped between the sound and the urethra and none could be seen in the bladder. A second insufflation was made and 30 c.c. lipiodol also injected. The latter could be seen in the bladder but no air. Another roentgenogram was taken including the kidney region and the ureters and kidney pelves were found distended with air to such an extent that the ureters looked like small intestine but were recognized as ureters from their position. If a little more air had been injected they would have ruptured. In a case like this if the walls of urinary canals were fragile air would infiltrate into the circulation and death result from embolism of the heart. Not more than 80 c.c. of air should be insufflated into



the bladder. There are probably many cases of reflux of air into the kidney but many of them have not been recognized because the air was thought to be in the intestine.

MASMONTEIL, F. Roentgenographic examination of the female genital organs with lipiodol. *Semana med.*, Buenos Aires, Apr. 8, 1926, xxxiii, 737-738.

The author has used the method of lipiodol injection into the uterus and finds it is not in the least harmful or even unpleasant for the patient. It is a very accurate method of diagnosis for some gynecological conditions, including simple abortion, extrauterine pregnancy, fibroma and ovarian cyst. It is possible by means of it to show the cause of some cases of sterility, as it demonstrates impermeability of the tubes. It also sometimes shows incontinence of the tubes as the cause of menstrual intraperitoneal hemorrhage. In these cases the fluid injected collects in Douglas' pouch without causing any contraction of the mouth of the tube. Even in cases in which the liquid escapes into the peritoneal cavity it does no harm. In one case 20 c.c. of lipiodol flowed through the tube into Douglas' pouch. The patient did not feel any pain or inconvenience either at the time of the injection or afterward and laparotomy some days later did not show a sign of peritoneal reaction.

MILLER, RICHARD H. Cancer and diverticulitis of the large intestine. *Boston M. & S. J.*, Aug. 5, 1926, excv, 253-257.

The occurrence of indefinite lower abdominal symptoms in a person of cancer age should make one suspicious of cancer; and suspicion should always lead to an examination of the stool for blood, and, still more important, a roentgen examination after an opaque enema. In the diagnosis of cancer of the colon, the enema is much better than the barium meal. The same picture may, although infrequently, be caused by peridiverticulitis. The degree of operability cannot be determined from the roentgen findings. Cancer of the cecum is the hardest of all to diagnose. Operative treatment of these conditions is the only method offering any chance of cure. Irradiation with roentgen rays or radium has not yet been shown to be of any help.

Diverticulitis of the large intestine is not so uncommon as is ordinarily supposed and usually occurs in the sigmoid flexure. In any case which seems like appendicitis but in which the symptoms and signs are in the left side, diverticulitis should be suspected. For this, conservatism is preferable to radical surgery. In diverticulitis there is usually a history of

repeated attacks with more or less fever. The roentgenogram will show up some diverticula but it is not to be depended on in making a diagnosis.

Five cases are presented showing difficult and unexpected problems in surgery of the large intestine.

MÜLLER, WALTHER. The development of coxa valga through epiphyseal displacement. *Beitr. z. klin. Chir.*, 1926, cxxxvii, 148-164.

Apart from the acute systemic diseases of the skeleton which lead to changes in the angle of the neck of the femur and other epiphyseal conditions terminating in coxa valga, there occurs a displacement of the epiphysis toward the neck of the femur in the lateral direction, a process which is of considerable importance in the understanding of most forms of coxa valga. The possibility for such a lateral shift of the cap occurs only in those particular cases where the space between the lateral acetabular edge and the upper lateral edge of the femur is greater than the greatest height of the cap of the femur. Wherever the edge lateral of the acetabulum and the upper lateral end of the neck of the femur happen to be separated considerably from one another, where larger lateral portions of the head are out of contact with the acetabulum, the epiphysis of the femoral head shows a tendency to lateral displacement over the neck of the femur.

In order to distinguish these relationships in the roentgenogram with complete distinctness, it is necessary to take the picture of the neck of the femur at a correct angle. The usual roentgenograms taken with external rotation of the limb are absolutely useless for this purpose, as they very easily give the impression of a certain shift of the cap toward the major trochanter. The necessary films must be taken with the limb in normal position or with internal rotation of the leg.

The consequence of a lateral shift of the epiphysis upon the neck of the femur is a coxa valga. The end of the femur appears straighter although the neck itself still maintains practically the same angle as in the normal. As in the case of coxa vara of adolescence, there later follows an adaptation of the contours of the femoral neck to the new position of the cap. The median edge of the femoral neck runs somewhat straighter in a convex curve and the upper edge runs toward the outwardly shifted lateral edge of the epiphysis and appears shortened. Through further osseous appositions to the now horizontally placed symphysis, there results subsequently a femoral neck which is really straight. Consequently the displacement of the epiphyseal joint will be

found fully developed in only a certain relatively early period; but the later genuine coxa valga is the end effect of this early epiphyseal displacement toward the outside.

This explanation permits an understanding of a variety of forms of coxa valga which have hitherto been only vaguely understood as regards their genesis. This is proven by an examination of the conditions in (1) coxa valga following flattening of the acetabulum (coxa valga luxans); (2) coxa valga due to vertical position of the pelvis; (3) coxa valga due to muscular tension; (4) coxa valga in genu valgum, and (5) coxa valga in inflammatory conditions. In most cases of these types, a shifting of the epiphysis toward the neck of the femur is the causative factor, the shift being laterally and upwardly. The condition permitting this lateral shift of the epiphysis, which takes place very gradually, is firstly the incomplete articulation of the head only in its medial sections with a flattening or vertical position of the acetabulum; and secondly, it may be caused by a permanent position of adduction of the femur.

NEGRO, MARIO. Cystoscopy and roentgenography in calculus of the bladder. *Arch. ital. di urol.*, Bologna, January, 1926, ii, 223-255.

Both cystoscopy and roentgenography are valuable aids in the diagnosis of vesical calculus and either the one or the other method suffices in a great many cases. But there are certain cases in which each method fails entirely or is insufficient for a definite diagnosis. Cystoscopy cannot be used in cases where it is impossible to introduce the cystoscope, as for example in children, in cases of stricture, in certain anomalies of the urethra and in calculosis of the urethra. And it cannot be used sometimes because of certain special conditions in the bladder, such as intense cystitis, which renders any distention impossible and copious hemorrhage or pyuria of the bladder which obscure the view. Cystoscopy may be insufficient or lead to mistakes in interpretation by reason of masses of detritus in the bladder such as blood clots or masses of pus, and in encrusted cystitis and encrusted tumors of the bladder. It may also fail in cases of calculi covered with clots and fibrin or ones completely enclosed in a mantle of organic tissue. And it may not show a calculus in spite of the cystoscopic picture being clear in calculi situated in a very deep vertex of the bladder which the cystoscope does not reach, calculi located in cystoceles or vesical herniae, calculi "capped" with a piece of vesical mucous membrane, or calculi in vesical diverticula.

Roentgen examination may fail to show a

vesical calculus because of excessive thickness of the walls of the abdomen which renders the bladder region opaque, or because of the chemical composition of the stones. Uric acid calculi and ones composed of ammoniacal calcium urate are not visible. Roentgen examination may lead to mistaken diagnoses in cases of shadows cast by encrusted bladder tumors, encrusted cystitis or encrusted clots or masses of pus or by reason of certain paravesical lesions impermeable to roentgen rays, including calcified cysts of the pelvis, dermoid cysts, calcified gummata and intestinal calculi.

As each of the two methods may be insufficient in the conditions outlined above and as the causes of failure are not the same for the two methods errors of diagnosis in calculus of the bladder can be greatly reduced by making systematic use in doubtful cases of both cystoscopy and roentgenography.

PEHU, H., CHASSARD, M., and ENSELME, MME. J. Roentgen study of congenital syphilis of the long bones in early infancy. *J. de radiol. et d'électrol.*, February, 1926, x, 54-68.

The author has made a study of the roentgen picture of syphilis from birth to two years of age and presents plates showing the results. There are four forms, the first two of which are rare. The gummatous form is very unusual although it is frequent after three years of age. The osteomalacic or destructive form is also unusual; it presents various phenomena due to dystrophy of bone tissue. The bones are very fragile and these infants often have multiple fractures. There seems to be a sort of rarefaction of the spongy tissue, a variety of osteoporosis. The roentgenograms show notches or lacunae, a dentate or worm-eaten appearance at the ends and along the edges which represent either true losses of substance or a rarefaction of the bone. There are no clinical symptoms and the condition is discovered only by roentgen examination.

The two other forms are frequent. Wegner-Parrot's osteochondritis is a disease of intrauterine life. It is generally discovered only by roentgen examination, for Parrot's pseudo-detachment of the epiphysis is the clinical manifestation of its maximum degree. It is only exceptionally found after the third month of life. It is characterized by dentate processes extending from a variable depth between the proximal face of the articular cartilage and the juxta-epiphyseal part of the spongy tissue. The process of calcification does not follow a normal course. Instead of being superimposed, as they are normally, the zone of calcification and that of cartilage inter-

penetrate each other reciprocally and irregularly. Osteogenesis is excessive in some places and defective in others. Soon necrobiosis occurs, due doubtless to defective arterial circulation, which alters the spongiosa already formed and the periosteum itself presents signs of hyperplasia. The fourth form, ossifying or hyperplastic periostitis, is found in 80 per cent of cases of syphilis in early infancy. Generally it shows no clinical symptoms. In the majority of cases it appears with absolute symmetry in the bones of the four limbs. It is an extra-uterine disease beginning in the first three months of life and extending up to the 18th month. The roentgen picture is almost pathognomonic. It is caused by the embryonic layer of the periosteum becoming affected by the syphilitic infection. Under the influence of the irritation caused by the spirochetes this layer manufactures granulations which penetrate the cortex and finally become encrusted with calcium salts. There is a sheath of calcified periosteum which often surrounds the whole length of the long bone; its outlines are generally regular but sometimes there are localized projections.

ROBERTS, R. E., and COHEN, MORRIS J. Osteitis deformans (Paget's disease of bone). *Proc. Roy. Soc. Med., Lond.*, March, 1926, xix, Sect. Electro-Therap., 13-40.

Sixteen cases of osteitis deformans are recorded (11 males and 5 females). The general features observed conform to the more than 300 human cases that have now been recorded in the literature.

The etiology of the disease is doubtful. The factors that have been suggested as possibly responsible are (1) toxins; (2) endocrine disturbances; (3) heredity or environment, and (4) syphilis. In the present series, 2 of the patients were sisters, and 2 others showed a positive Wassermann reaction. In only 2 cases did the symptoms appear before the age of forty. In 11 cases the earliest symptom was pain in the lower limbs. Muscular weakness, cramps, deformities, fractures and head enlargement were usually later manifestations. In 3 cases spontaneous fracture of the femur occurred; in one case twenty incomplete "cracks" were found roentgenologically in the convex anterior border of the tibia, and three in the femur. The pathologic process in Paget's disease is one of "halisteresis" or a progressive decalcification and resorption of the old bone and replacement by an osteoid tissue.

The roentgenographic appearances illustrate the various stages of this pathologic process. In the skull the earliest roentgeno-

graphic change is a blurring of the outline of the calvarium with, as a rule, thickening and "flattening." The later changes are those produced by progressive thickening with irregular calcification in the osteoid tissue, frequently affecting the base as well as the vertex. Enlargement of the pituitary fossa was shown in 3 cases.

In the long bones one of the features is the production of "trabeculae" in the thickened cortex. These are at first faint, gross, and ill defined, but later become denser and more sharply defined. The stage of the disease in any bone can be gauged by the type of trabeculae shown in the roentgenogram. Fractures occurred only when the bone was in the early amorphous or faint, blurred, trabecular stage. Occasionally, as in the metacarpals the roentgenographic shadows indicate a dense, granular deposit of calcium in the thickened cortex; in the os calcis the appearances may be merely those of coarse trabeculae along the normal lines of lamellation.

In 8 cases of the present series the diagnosis of the disease was primarily roentgenographic. Characteristic roentgen changes were found in the skull in 15 cases, pelvis 15 cases, femur 15 cases, and tibia 15 cases. Roentgen changes were often found in parts quite unsuspected of disease of any sort. This emphasizes the necessity for: (1) local roentgenographic examination of cases of obscure limb pain; (2) general roentgen examination of the skeleton (especially skull and pelvis) in all cases where suggestive local bone changes have been found. Where the local roentgenographic changes suggestive of "osteitis fibrosa" were found, a general roentgen examination invariably showed appearances which were characteristically those of "osteitis deformans." Roentgenologically it is impossible to differentiate between generalized osteitis fibrosa and osteitis deformans. Osteitis fibrosa cystica which may be localized to a single bone is probably a different disease or at any rate a different type.

The treatment of osteitis deformans is at present very unsatisfactory.

VAN DESSEL, ARTHUR. Calcification of gliomas of the brain. *Arch. franco-belges de chir.*, October, 1925, xxviii, 845-874.

With recent improvements in roentgen technique, including the introduction of reinforcing screens, the use of the Potter-Bucky grid for eliminating secondary rays, combined with the stereoscopic method, calcifications can be demonstrated now that could not have been shown a few years ago. In an examination of Cushing's material since 1921 the author found that 17 out of 126 gliomas of the cerebral

hemispheres, or 13.5 per cent, showed calcification. This does not include the cerebellar gliomas, only two of which showed calcification. It is possible that cerebellar gliomas because of their position do not have as long a life as those of the cerebrum and so do not calcify so frequently, or it is possible that the calcification does not show so well because of superposition of the shadow of parts of the petrous bone. One old case of glioma from 1907 which was not roentgenographed before operation was examined and showed calcification. The author gives the clinical histories and several roentgenograms of the 17 cases of glioma which presented calcification. A study of these cases shows that such gliomas can be accurately localized by roentgen examination. The calcification is found chiefly in gliomas made up of highly differentiated cells, which are therefore the ones in which the prognosis is most favorable. The operative mortality in these cases is very low. The calcium salts are deposited almost exclusively in the walls of the vessels after they have undergone hyaline degeneration.

WILKIE, D. P. D. Coincident duodenal and gastric ulcer. *Brit. M. J.*, Sept. 11, 1926, ii, 469-470.

The author examined 490 bodies post mortem for duodenal ulcer. In 41, one or more such ulcers were found (8 per cent). In 5 cases one or more gastric ulcers were present along with the duodenal ulcers. That is, in 12 per cent of cases of duodenal ulcer a coincident gastric ulcer was found. During the past five years an experience with 300 operated cases of ulcer gave the following incidence of involvement:

	Male	Female	Total
Duodenal ulcer alone.....	167	54	221
Gastric ulcer alone.....	17	20	37
Coincident duodenal and gastric ulcer.....	27	15	42
Totals.....	211	89	300

The roentgen-ray picture after a barium meal is an important element in the accurate diagnosis of this condition. In the early cases, the roentgen evidence of gastric ulcer may be a little uncertain, and may be confined to a slight irregularity of outline of the lesser curvature with some degree of spasmodic hour-glass contraction. In the advanced cases where stenosis has occurred, the very typical picture of hour-glass stomach and duodenum leaves no doubt as to the diagnosis.

Two groups of cases are to be distinguished when considering operative measures: (1) Active ulcers without stenosis in persons under

fifty years of age; and (2) unhealed but cicatrized ulcers with stenosis, in elderly subjects. The Balfour operation is recommended for the first group, while for the second group purely anastomotic operations give a lasting cure.

It seems clearly demonstrated that coincident ulceration in the stomach and duodenum is relatively common. In this series it occurred in 16 per cent of all duodenal ulcers and in 53 per cent of all gastric ulcers.

VAN NECK. A case of sacralization of the fifth lumbar vertebra. *Arch. franco-belges de chir.*, June, 1925, xxviii, 505-510.

A girl aged eighteen after a fall from a street-car began to have pain in the right lumbar region which increased progressively. There was a very audible and painful cracking sound when she bent forward and the limp increased until she had to walk with crutches. Roentgen examination showed sacralization of the 5th lumbar vertebra on the right, but there was a striking discrepancy between the roentgen and operative findings. The roentgenogram showed a large transverse process which reached the iliac bone; it was very large at the base and seemed to be connected with the sacrum also. Operation showed a process not larger than a pencil which was directed forward and attached to the iliac bone 1 cm. below the crest by solid ligaments. It was very hard to remove on account of its close attachment by ligaments to the pelvis and sacrum and because of the copious hemorrhage. Its point of implantation on the vertebra could not be seen. Although the process was not completely removed the pain stopped at once but the cracking sound and the scoliosis were not completely corrected until after about two months.

ZANOLI, RAFFAELE. Congenital luxation of the patella. *Chir. d. org. di movimento*, December, 1925, x, 83-164.

Zanoli gives clinical histories of 13 cases, profusely illustrated by photographs and roentgenograms. This is an unusual affection; Karl in 1921 collected 137 cases and 15 have been published since then, making a total of 152. The condition is markedly familial and is frequently accompanied by other anomalies of development, such as luxation of the hip, flat-foot, scoliosis, etc. In one of the author's cases there was complete absence of the joint menisci and the crucial ligaments of the knee-joint. This anomaly has never been described before. The patient's father was syphilitic and she had a doubtfully positive Wassermann.

After discussing the various theories of pathogenesis, the author concludes that con-

genital luxation of the hip is due to an anomaly in the position of the joint axes, that is to an external rotation of the tibia and an inward rotation of the distal epiphysis of the femur, due to mechanical factors during intrauterine life.

Solieri reports that roentgen pictures of the knee-joint show that in hyperextension the patella occupies the supratrochlear fossa, while in extension the upper part is in the supratrochlear fossa and the distal part in contact with the trochlear. In moderate flexion the patella moves downward still more, so that only part of it is in relation with the trochlea, and in extreme degrees of flexion it lies entirely in the intercondyloid fossa. The author's roentgenograms of normal individuals confirm those of Solieri and show that in extension the patella occupies the trochlear region, while in flexion it lies lower down and occupies the intercondyloid fossa. He also examined fetuses from 8 to 25 mm. in length; all of them were in the physiological flexed position of the fetus in the uterus and the patella was somewhat higher than in the flexed position of the infant or adult. In those 8, 11, 12 and 14 cm. in length the upper two-thirds of the patella lay at the level of the trochlea, while the lower third was in the intercondyloid fossa, while in fetuses 18 and 25 cm. in length it had moved down until half of it lay in the intercondyloid fossa.

The roentgen pictures in congenital luxation show the patella displaced outward, more or less marked decrease in the intercondyloid fossa, and a marked decrease in the articular fossa of the tibia, which in some cases occupies only a small part of the internal articular surface of the bone. The roentgenogram in some cases shows an inward displacement of the axis of the femur, a real lateral displacement and not the simple deviation of valgus. In the lateral projection the outlines of the lower epiphysis of the femur in some cases are rather flattened and the margins of the two condyles are not superimposed.

There are four chief methods of treatment of this condition: operations on the bone, operations on the ligaments and capsule, operations on the muscles, and mixed operations. The author used various methods in his cases and comes to the conclusion that perhaps the best one is combined median transplantation of the patellar tendon and capsulorrhaphy. In connection with median transplantation of the patellar tendon he emphasizes one point in technique, namely the disinsertion of the quadriceps tendon. He used this method in 4 of his cases and in one of them particularly after having cut the insertion of the vastus

externus and the lateral attachments of the patella he could flex the knee without luxation of the patella. This detail of technique is justified by the fact that one of the most characteristic changes in this affection is external displacement of the whole extensor system—quadriceps, patella, patellar tendon—and this is the best method of restoring the extensor apparatus to its normal relations, re-establishing normal function and guarding against recurrence.

BÉCLÈRE and SIREDEY. Intra-abdominal tumor cured by roentgen therapy without recurrence after five years. *Bull. Soc. d'obst. et de gynéc. de Par.*, March, 1926, xv, 166-167.

A woman aged fifty-four, teacher and directress of a school, was examined in June, 1920 and showed an unusual splenomegaly without leucemia which could not be attributed to malaria, syphilis or tuberculosis. In June, 1916, she had had a tumor the size of a fist removed from the external orifice of the left inguinal canal. She had never menstruated. As a matter of fact, though she had all the appearance of being a woman it was a case of external masculine pseudohermaphroditism. At the external orifice of the right inguinal canal, exactly symmetrical with the operation scar, there was a smooth hard oval body pressure on which caused nausea. It was assumed to be testicle and it was found from the histological report that the tumor removed some years before had been a seminoma. A diagnosis of metastatic seminoma of the spleen was made and roentgen treatment begun July 3, 1920 and terminated Dec. 16 the same year, 20 treatments having been given, at first weekly and later at longer intervals. Ten days after the first treatment although small doses of moderately penetrating rays had been used the spleen had greatly decreased in size; a month and a half later it was normal in size. The irradiations were continued as a precautionary measure. Seminomas and their metastases are very radiosensitive. At present ten years after the original operation and five years after the roentgen treatment of the metastasis there are no signs of recurrence.

BÉGOVIN. Two cases of death from intra-uterine use of radium. *Bull. soc. d'obst. et de gynéc. de Par.*, February, 1926, xv, 137-138.

Among the 137 cases in which the author has used radium within the uterus for cancer of the body of the uterus or the cervix he has had one case of slight peritoneal reaction with recovery and two deaths. The first was a case of basal cell epithelioma; on account of the

patient's stoutness and the depth of the vagina he thought either abdominal or vaginal hysterectomy was dangerous and so used two tubes of radium tandem; each contained 13 mg. radium element filtered through 0.5 mm. platinum and 2 mm. gold, all enclosed in a tube of metallized rubber. The radium was applied Nov. 24, and removed Nov. 28. As the number of millieuries was insufficient the radium was re-introduced; for the next few days the patient's temperature varied between 36.4° and 37.8°C. On Dec. 3 the radium was removed and that evening her temperature rose to 38.4°C. On the 5th her abdomen was distended, her general condition bad and the bases of her lungs congested. On Dec. 9 she died. Autopsy showed the abdomen full of pus and a large triangular perforation of the uterus on the posterior wall at the site of the cancer.

He had another similar case of death where radium was introduced into the uterus for cancer of the cervix but in this case, an autopsy did not show any perforation of the uterus; the infection must have taken place by the lymphatic route.

COMMANDEUR-EPARVIER and MICHON. Cancer of the cervix of the uterus and pregnancy; Caesarean section; Porro's amputation; radium therapy. *Bull. Soc. d'obst. et de gynec. de Par.*, January, 1926, xv, 59-62.

A woman aged forty who had had four children, the last one ten years of age, was sent to the hospital July 31, 1925 for a seven months pregnancy and cancer of the cervix. During the night of the 21st of August she had a very severe hemorrhage. Her general condition was very bad and the pulse could not be felt. She was given stimulants and the next morning a classical Caesarean section was performed under ether anesthesia. A normal girl weighing 3000 gm. was extracted. Porro's amputation was performed at once and the abdomen closed. Two weeks after the operation the gangrenous part of the stump was resected. The cervix was dilated by Hegar bougies up to No. 12 and two tubes of radium bromid containing 50 mg. each introduced through the abdominal orifice; usual quadruple filtration. Three tubes of 75 mg. each were placed in a circle around the cervix. Therefore a total of 325 mg. radium bromid was applied for seventy-two hours, or 57.6 mc. After removal of the tubes transcervical drainage was established for a week. Three days after the tubes were removed her temperature rose and oscillated between 37° and 39° for eleven days and during this time there was incontinence of urine. The patient weighed 60 kilograms on Aug. 1

and on her discharge Nov. 6 she weighed 45 kilograms. During the last fifteen days of her stay she regained her appetite. Vaginal palpation three weeks after the radium was applied showed that the large cervical tumor had completely disappeared. The cervix was small and hard; there was slight induration in the cul-de-sac on the right.

Michon believes that this method of applying radium through the abdominal orifice after Porro's amputation is a very satisfactory technique. If radium is used during pregnancy it should be applied only in the vagina. Intracervical application is generally followed by abortion or premature delivery.

COUTARD, H., and REGAUD, Cl. Results and technique of roentgen therapy of cancer of the cervix of the uterus. *J. de radiol. et d'électrol., Par.*, April, 1926, 151-154.

From 1920-1923 the authors treated 32 cases. All except one were absolutely inoperable. The patient who was operable died. Treatment with radium after failure of roentgen rays brought about only temporary improvement. Of the 31 inoperable cases 6 were not able to stand the treatment and it had to be given up. Of the remaining 25, seven are still alive and free of symptoms of cancer one was treated in 1920, one in 1922 and 5 in 1923; this give 28 per cent cures. Most of the patients not actually cured were greatly improved and some of them are living two and three years after treatment.

Three methods of treatment have been followed: (1) by roentgen rays alone; 12 of the 32 cases were treated in this way; in 3 the treatment had to be given up and 4 of the other 9 are cured, or 44.4 per cent; (2) treatment first by radium and then by roentgen rays; most of the 10 cases treated in this way were ones of recurrence after radium treatment and none of them recovered. This confirms what the authors have found in skin cancer, namely, that roentgen rays are ineffective after radium treatment; (3) treatment by roentgen rays first followed by radium treatment; 10 cases were treated in this way and 3 recovered, or 33 per cent.

The authors have never had any serious skin reactions. In the early period of their treatment when they were using relatively small skin fields and a filtration of 1 to 1.5 mm. zinc they frequently had more or less disturbing intestinal symptoms and changes in the circulation and blood picture, but since enlarging the fields and using 2 to 2.5 mm. zinc they have never had any of these symptoms.

Their present technique is to use a maximum tension of 180 kv., a filtration of 2.5 mm. zinc,



skin-anticathode distance of 0.50 to 0.75 meters and fields of 375 to 450 sq. cm., the number depending on the case. The Germans in general prefer small fields and slight filtration, 0.5 to 1.0 mm. zinc or copper, and try to measure very accurately so that the rays shall strike only the tumor and not the surrounding tissues. But as such determination of the exact limits of the cancer is almost impossible the authors prefer to use less dangerous and more elective rays. Of course this involves loss of time and the methods of quantitative dosimetry are not very satisfactory. Their skin doses amount to about 60 H units for one-half of the pelvis (about 14,000 Solomon's R units) or for the whole of the pelvis 100 to 120 H. They never exceed 4 to 5 H units (1100 to 1200 R units) per day. The maximum time of treatment is twenty-five days; the results are not so good if it is extended farther. Perhaps it would be well to reduce it to fifteen days or even less, but that is difficult with the tubes now available and besides it produces intolerance in the patient. The total irradiation time is twenty-five to fifty-five hours according to the size of the territory irradiated.

DI SANT'AGNESE, V. ARTOM. Radium treatment of cancer of the cervix and the cervical canal. *Clin. obstet.*, May, 1926, xxviii, 223-233.

The best field for radium treatment of cancer of the cervix is in inoperable cases. The author has treated 413 cases exclusively with radioactive substances. He has used either radium or mesothorium, giving 3 to 4 applications of twenty-four hours each distributed over fifteen to twenty days: dose 50 mg. radium element. If possible an intrauterine or intracervical focus with foci in the vagina for cross fire. Filtration for mesothorium through 1 mm. of brass and for radium through 1 mm. of gold and platinum; external tube of rubber to absorb the secondary radiation. For the applications in the vagina the radium was covered with cork and outside that with rubber. He has found needles useless except to destroy cauliflower vegetations. He does not use an intrauterine focus if it is necessary to dilate the cervix, for fear of dissemination, nor does he advocate the introduction of tubes through incisions in the fornix of the vagina or the abdominal wall.

Among the 413 cases 25 are excluded on account of recurrence and 170 because operated on since 1920, so the five-year results are not known. This leaves 218 operated upon five years or more ago. Of these 16, or 7.34 per cent, are definitely known to be alive and well. Reports have been received from only 50 per cent and it is probable that there are others

still living; they were mostly domestics or working women and it is hard to get in touch with them because of their frequent changes of address. While this is not a high percentage of cures it is to be remembered that they were all inoperable cases, many of them far advanced and no selection was made. In one of the cured cases the treatment was given without any hope of cure, only because the family insisted.

In another series of 127 cases treated successively with radium and roentgen rays since 1920, thirty-five, or 27.6 per cent, are alive after two years or more, which is a high percentage considering that they were all inoperable and some of them advanced. During this same period radium treatment alone has given 19 survivals out of 130 patients, or 14.3 per cent. The combination of radium and roentgen rays would seem from this to be superior to radium alone. In spite of the doubts of its value expressed by Regaud, radium followed by roentgen rays is effective, although roentgen rays followed by radium are more so. The reason the author has sometimes given radium first is to avoid the general disturbance that sometimes follows the primary use of roentgen rays.

In still another series of cases he has used radium following hysterectomy. While this would seem dangerous on account of the removal of the uterus and the close proximity of the bladder and rectum he has found that two treatments of twenty-four hours each with 50 mg. radium element with an adequate metal filter and 2 cm. of cork are well borne. He has never had any injury from this treatment which he has used in 32 cases. It is particularly valuable for preventing recurrence in the vaginal scar. Since 1920 he has used a combination of radium and roentgen rays when possible. Among 29 cases he has had 17 survivals for two years, or 58.6 per cent; among 25, fourteen survivals for 3 years, or 56 per cent, among 14, six survivals for four years or 43 per cent. He thinks therefore that it is better to perform a less radical operation than the Wertheim and follow it up with roentgen and radium therapy than to perform the Wertheim operation.

EDLING, LARS. Treatment of surgical tuberculosis by roentgen rays. *Paris méd.*, Feb. 6, 1926, xvi, 127-132.

The best field for roentgen treatment is in tuberculous adenitis. There are three forms: (1) simple hyperplastic lymphomas; (2) closed lymphomas with central caseation or suppuration, and (3) abscessed glands with fistulas. In groups 1 and 3 roentgen treatment should be

given in the beginning as it cures the majority of cases. Isolated and mobile lymphomas which prove resistant to roentgen therapy should be extirpated. In group 2 where there are abscesses in the center of the lymphomas they generally come to the surface on roentgen treatment and recovery follows. But caseous foci in the center are very hard to cure. Roentgen treatment should not be pushed too far in these cases, but the resistant glands should be extirpated. Recurrences and cases already operated upon should always be irradiated.

The author has collected 270 cases of lymphoma treated by irradiation: 73 per cent were cured and there was improvement in 14.8 per cent; 8.5 per cent had relapse and 3.7 per cent died of the tuberculosis or an intercurrent disease. Small doses should be used ( $\frac{1}{3}$  to  $\frac{1}{4}$  skin erythema dose) with 3 to 4 mm. aluminum filter, or in exceptional cases 0.5 mm. zinc or copper, given at intervals of four to six weeks. Larger doses are dangerous.

The prognosis of tuberculous peritonitis has improved considerably since the introduction of roentgen treatment. Irradiation should be given at once in plastic-adhesive cases, in cases which are inoperable because of the poor condition of the patient and in cases in which the patient refuses operation. Exudative forms should be operated on first and irradiated afterwards, though mild exudative forms may also be irradiated at once. Serious consequences may result from an excessive deep dose so some caution is necessary. Jüngling calculates the dose according to kilograms of weight, or 4, 6, or 8 fields may be used and each irradiated with a small dose,  $\frac{1}{5}$  to  $\frac{1}{3}$  skin erythema dose. The maximum filter should be 4 mm. aluminum, the minimum interval between treatments four to six weeks.

The results of surgery in renal tuberculosis are so good that roentgen treatment is scarcely indicated except in inoperable cases. Its only indication in vesical tuberculosis is when the renal tuberculosis, which is generally the cause of it, is bilateral and therefore inoperable. Steppe has filled the bladder with collargol in vesical tuberculosis in order to make use of the secondary radiation from the particles of metal in suspension; but in general the indications for roentgen treatment in bladder tuberculosis are very doubtful. Surgeons in general prefer epididymectomy or castration in cases of unilateral tuberculosis of the epididymis, though roentgen treatment may be used in mild cases. Irradiation is indicated when the disease is bilateral or when after extirpation on one side the disease appears on the other.

Vogt was the first to use roentgen therapy in tuberculosis of the female genitalia; among 14

patients treated exclusively by roentgen rays 6 recovered, 3 were considerably improved, 2 died and 1 did not improve. Weibel had 82 per cent good results and 18 per cent mortality. Vogt thinks roentgen therapy is indicated in cases of tuberculous endometritis without peritoneal or adnexal symptoms, in cases where operation is contraindicated and in bilateral adnexitis. But the most important use of roentgen treatment in these cases is postoperative and the percentage of cures has been increased from 66 to 87 by its use. Vogt uses large fields and long intervals; he gives 50 per cent erythema dose while Jüngling recommends only 10 to 20 per cent.

Great care must be exercised in the roentgen treatment of tuberculosis of the larynx because of the danger of injuring the larynx; and as tuberculosis of this organ is almost always secondary to that of the lungs the prognosis depends greatly on the primary disease. The best technique is to use 8 to 10 Kienböck units with a focal distance of 24 cm. and a filter of 4 mm. aluminum over three fields, one in front and one on each side of the larynx for a week; the next week the series may be repeated and then the treatment stopped for three weeks.

In general the results of roentgen treatment are good in bone and joint tuberculosis but they are not equally good in all the joints and recovery is slow and begins with an indolent stage of long duration. So the cases have to be followed up for several years and suitable general treatment should be given in connection with the irradiation. Great care must be used in dosage as lesions, not only of the soft parts but also of the bones, may be caused by relatively small dosage, particularly in the lower limbs. Not more than 20 to 30 per cent skin erythema dose should be given, or in very deep lesions 40 to 50 per cent, less in children than in adults. Among the forms of bone tuberculosis the one that gives the best results in roentgen treatment is spina ventosa. Costal tuberculosis is often the starting point of tuberculous pleurisy and therefore roentgen treatment is rather dangerous; light baths are to be preferred. In tuberculous spondylitis the time required for cure is often greatly shortened by roentgen treatment, and the same is true of sacroiliac tuberculosis. Roentgen treatment is to be preferred to surgery in tuberculosis of the wrist and joint and operation should be almost entirely given up in scapulo-humeral tuberculosis. The results of roentgen treatment are not so good in tuberculosis of the knee and ankle; there are often recurrences which have to be operated upon finally. This is possibly due to the poorer circulation as compared with the arm, and possibly to the irritation from walking.



FERROUX, R., MONOD, O., and REGAUD, CL. Treatment of cancer of the neck of the uterus by radium at a distance; technique and first results. *J. de radiol. et d'électrol., Par.*, January, 1926, x, 21-23.

The authors now have 4 gm. of radium available. They at first used it at a distance of 6 cm., then of 8 cm. and now of 10 cm. The frame for carrying the radium is supported by a modified roentgen tube stand. The frame is a rectangular plate 11 X 14.5 cm., entirely covered by 80 tubes each containing 50 mg. radium. The gamma radiation is filtered through the equivalent in platinum and brass of 1 mm. platinum. Protection is by 2 cm. lead. The distance from the skin is maintained exactly by a localizing tube of wax lined with 1 cm. lead interposed between the radium and the skin, the opening of which, closed by a plate of wax, is moulded to the part to be irradiated without the weight of the apparatus resting on the patient. There are 2 to 7 portals of entry which may be anterior iliac, sacro-iliac, lateral ilio-femoral or vulvo-perineal, depending on the localization and volume of the tumor to be treated. The doses which at first were 500 millicuries have now been increased to as high as 2 curies. The time of treatment has now been reduced to 12-15 days with one or two treatments a day.

Since August, 1924 they have treated 32 patients with cancer of the cervix, 26 of them absolutely inoperable; sometimes the above treatment was used alone, more frequently it was combined with utero-vaginal radium treatment. Of course it is too soon to report final results, but the work so far has shown that the organism can tolerate large doses of gamma rays filtered through 1 mm. platinum, distributed over a large pelvic field better than it can roentgen rays even if filtered through 2.5 mm. zinc. Most of the patients had only very slight objective and subjective symptoms belonging to the syndrome caused by penetrating irradiation. There were transitory changes in the blood which are being studied. Seven patients showed slight and temporary digestive disturbances, colic, diarrhea, nausea, which seemed to begin about the time the treatment was shortened and the dose increased. No signs of infection were seen, which indicates that this method decreases the resistance of the tissues to infection less than other methods of irradiation. There were slight skin changes, erythema, pigmentation, dry desquamation when treatment was given at a distance of 6 cm. but no such changes have been seen since the distance was increased to 10 cm. The effectiveness of gamma irradiation is proved. Cancerous infiltrations of pelvic connective tissue which do not yield to utero-

vaginal radium therapy because of their superficial localization, disappeared entirely. Among 22 cases treated the first year 16 show no signs of cancer. As the limit of tolerance of the tissues has not yet been attained with the present dosage the results will doubtless improve as the maximum dosage is determined.

GAYET, G., and PEYCELON, R. Treatment of cancer of the prostate. *Arch. franco-belges de chir.*, Sept., 1925, xxviii, 759-781.

From 1912 to date the authors have observed 106 cases of cancer of the prostate. They exclude the cases from 1912 to 1914, performed in the early days of radium therapy before the technique was well developed, and those treated in 1925 as being too recent. This leaves 71 cases, in 33 of which it was impossible to do more than give palliative treatment because of the advanced stage of the disease. The other 38 were given radium treatment. They used tubes of 49 to 50 mg. containing 53 per cent radium element; they almost always used two tubes simultaneously; in 14 cases they left the tubes in place twenty-four hours, but since 1921 they have irradiated for forty-eight hours in 23 cases. In the beginning the total dose was 9 millicuries; since 1921, 18 mc. and in some cases of repeated treatments 27 or even 36 mc. In the majority of cases they used the perineal route, puncturing with a trocar by Marion's method; in 14 cases they used the hypogastric route, the tube being placed in contact with the tumor after cystostomy or placed in the bed of the prostate after enucleation of the gland. In 7 cases they used the rectal route, with triple filtration through tubes of platinum, silver and rubber. They used the urethral route in only 3 cases. They never implanted needles directly in the tumor after perineal incision and exposure of the prostate. In one case they implanted 6 needles in the floor of the bladder after hypogastric section and left them in for ninety-six hours; the result was bad and the cancer continued to progress. In 8 cases they performed transvesical prostatectomy before using radium.

Among the 38 cases treated 15 have disappeared since the year following the treatment and nothing is known of them. Nineteen are dead; 4 of them survived the treatment less than a month; 5 for two months; 3 for four to six months; 2 for ten months; 3 for a year; 1 for eighteen months; 2 for twenty months and one for twenty-nine months. Four are still living; in 2 cases it has been six months since the treatment and in 2 ten months. From these results the authors have decided to give up radium treatment in operable cases. Surgical removal of the tumor is the treatment of

choice. The prostatectomy should be total and extracapsular, removing in one block the prostate and seminal vesicles, the beginning of the vas deferens and the neck of the bladder as well as the fibrous walls of the aponeurotic bed of the prostate. The only hope of better results is to make an early diagnosis while the cancer is still limited to this zone which can be removed. As soon as this limit is passed surgery is no longer effective and radium may be tried with a view to cutting off the lymphatic routes by which the cancer is spread. In the period of invasion of the bladder or of prostatopelvic cancer radium is contraindicated. The only thing that can be done is to perform palliative operations, such as cystostomy which relieve the patient's suffering and prolong his life somewhat. Radium in these cases may cause rapid metastasis or serious intoxication in addition to violent pain.

NALDO, NICOLIS. Roentgen therapy of fibromyomas of the uterus with one treatment. *Arch. di radiol.*, Jan-Feb., 1926, ii, 57-70.

The author treated 30 cases from December, 1921 to November, 1923 by this method. He gives a table showing the age of the patients, the part of the intermenstrual period at which the treatment was given and the outcome with regard to cessation of menstruation and disappearance of the tumor. Twenty-seven of the patients were cured and in 3 there was recurrence, one in six months, one in eight months, and one in nine months. These patients were given another treatment and 2 were cured, while in the third hysterectomy had to be performed. In the great majority of cases the uterus remained slightly enlarged and irregular. At first the regression of the tumor was quite rapid, until it had been reduced about half and after that there was a period of slower decrease. The regression began immediately after the treatment, sometimes before amenorrhea was established and was sometimes accompanied by a copious white discharge.

He tried as far as possible to irradiate in the first half of the intermenstrual period because if the rays act at this time on a mature follicle or young corpus luteum they prevent the formation of those substances which stimulate the next menstruation, while if the irradiation is performed in the second half of the intermenstruum the hormones which stimulate the next menstruation have already been poured into the circulation and premenstrual changes have already begun more or less. Excluding the 10 cases in which it was not possible to determine the time in the intermenstrual period, among the 14 irradiated in the first half there was immediate amenor-

rhea in 4, or 28.5 per cent, in 7 there was menstruation only once and in 3 two menstruations, or 21.5 per cent. Among the 6 irradiated in the second half of the intermenstruum there was one menstruation in one case, or 16.6 per cent, two menstruations in 4, or 66.6 per cent and three menstruations in 1, or 16.6 per cent.

Seitz and Wintz recommend 34 per cent of an erythema dose, but the author allowed 40 per cent. He used a tube which gives a dose of 20 per cent at a depth of 10 cm. with a skin distance of 25 cm. If the ovary is not more than 10 cm. distant from the skin an anterior and a posterior field on each side are enough. In case of very large fibroids in stout women where the ovary is probably deeper the number of fields may be increased. In general, the Germans try to act indirectly on the tumor through the ovary, while the French prefer to act directly on the tumor cells. But the author believes the difference is theoretical rather than practical and the results are about the same with the two methods.

He emphasizes the importance of being certain of the diagnosis of fibroid before giving the treatment, preferably by histological examination of material obtained by curettage, because roentgen treatment has often been blamed for causing cancerous degeneration of fibroids when as a matter of fact the tumor was probably malignant to begin with.

The signs of artificial menopause brought about by the treatment do not differ at all from those of the normal menopause. The injuries sometimes complained of in roentgen treatment of fibromas of the uterus, such as roentgen dermatitis, proctitis, cystitis, etc., are to be attributed to errors in technique rather than to the method itself and can be avoided with sufficient care. He has seen general roentgen sickness only in women who were in a poor condition of nutrition and anemie.

GUNSETT, A. Cancer of the bladder and deep roentgen treatment, *J. de. radiol. et d'électrol.*, Par., January, 1926, x, 14-20.

Cancer of the bladder is generally so malignant and operative mortality so high that an attempt at roentgen treatment is completely justified. The author gives the clinical histories of 11 cases treated by roentgen therapy. In 6 of them he succeeded in bringing about complete disappearance of the bladder tumor, which in some of the cases was very extensive. In one case the treatment was postoperative after extirpation of the tumor. The other 4 cases were failures. Among 6 cases in which the tumor disappeared 2 of the patients have died.

One of them died of a rectal tumor which was independent of the bladder tumor and one died of an intestinal disease the nature of which is not entirely clear, but the bladder tumor did not recur. Among the other 4 cases, 2 are recent, one dating from March, 1922; this patient is free of recurrence after three years and is working at his trade as a house-painter. The other operation was in the beginning of 1923 and the patient is still in perfect condition.

The results of deep roentgen therapy of cancer of the bladder are therefore not important and the best course to follow is in cases which are still operable by partial cystectomy to operate, followed by postoperative roentgen treatment. If the tumor is inoperable roentgen treatment is indicated. This might be advantageously combined with radium treatment, the radium tubes being introduced by means of a cystoscope or a Nélaton catheter. This is the method which the author intends to follow in cases resistant to roentgen treatment.

HERNAMAN-JOHNSON, F. The treatment of rodent ulcer. *Lancet, Lond.*, Feb. 20, 1926, i, 389-391.

The treatment of choice in the case of "virgin" rodent ulcers is radiation therapy. Clinical experience leads the author to believe that concentration of roentgen-ray dosage may give good results in many cases, and the method is a convenient one; but it affords no guarantee against recurrence. Radium treatment suffers from the same disadvantages. Not only do recurrences appear with any form of radiation treatment, but as a rule the tumors yield slowly if at all to further application of the same type of radiation. On the other hand, a method which is in essence stimulative, such as the so-called ionization with zinc, may effect a cure. In the case of a recurrence, rays of a different wave length from those originally used should be employed. If improvement is not manifest within a month, some method of resensitizing the tissues, as by curettage or ionization, should be resorted to, after which radiation may again be given a trial.

If the above methods do not produce definite and continuous improvement at the end of two months, the diathermic cautery should be employed. This method owes its success not merely to destruction of cancer cells, but to the sharp reaction produced in the surrounding tissue. If all recurrences are dealt with promptly there should be no need for surgery in the ordinary sense of the term. When, however, the recurrence has already assumed large proportions it may be necessary to invoke the aid of the plastic surgeon to make good what has been destroyed.

SOLOMON, I., and BLONDEAU, A. Roentgen therapy of papilloma of the larynx. *J. de radiol. et d'électrol., Par.*, March, 1926, x, 112-114.

Papilloma of the larynx is seen chiefly in children from two to six years of age. Under surgical treatment the prognosis has been rather serious; tracheotomy is almost always necessary and the papillomas recur constantly, so that although they are benign they are very troublesome because of the interference with respiration and speech and because of the necessity for repeated operations.

The authors describe a case in a young man aged seventeen who had had papillomas since the age of seven; at first he was hoarse and then had progressive aphonia until at last he could only whisper. He had had four laryngeal operations in 1918 and 1919; the dyspnea increased progressively and tracheotomy had to be performed in 1920.

Roentgen treatment was commenced Jan. 14, 1925. Laryngoscopic examination at this time showed papillomas almost completely covering both vocal cords. From Jan. 14 to Feb. 11 he was given a total dose of 7000 R on two cervical fields, right and left with very penetrating rays (spark gap 40 cm.), filtered through 0.5 mm. copper and 2 mm. aluminum. A dose of 1000 R was given twice a week. Ten days after the beginning of treatment the tracheal cannula could be removed, respiration improved and laryngoscopic examination immediately after the last treatment showed great decrease of the papillomas. Fifteen days after the last treatment his voice was almost normal. As there were still some papillomatous vegetations nine weeks after treatment a second series of irradiations were given which were not well borne and treatment was stopped after 3000 R had been given. The patient was seen in October, 1925 and is completely well; nothing abnormal can be seen but a notch in the posterior part of the left vocal cord from one of the operations. He can speak normally and even sing. One of the authors treated two patients in 1920 and 1921; their history was about the same as that of the above case. They were treated with moderately penetrating rays (100 kilovolts, filtration through 10 mm. aluminum) and the total dose of 8000 R was distributed over a period of twelve weeks. There was permanent cure in both cases.

Jüngling has always been able to cure papillomas of the larynx with one roentgen treatment; he irradiates through two cervical fields and gives a dose which he estimates at 80 per cent of the skin erythema dose. He has never seen recurrence, after a period of observation of three years, nor has he ever seen any lesions

caused by the rays. The authors consider roentgen therapy the treatment of choice for papillomas of the larynx as it quickly brings about permanent cure without any scars to interfere with respiration or phonation.

WINTZ, H. Experiences in the irradiation of breast cancer. *Brit. J. Radiol.*, April, 1926, xxxi, 150-156.

A review of cases treated at the Erlangen Clinic confirms the facts already found concerning uterine carcinoma. Breast cancer must be treated in the initial stages to yield the best results. An analysis of 106 cases is given in Table I. Under the heading "lost" are included all those who died whether of carcinoma or of intercurrent disease, those who could not be followed up, and also patients who were at the point of death at the end of the three years, whether from cachexia or from distant metastases.

TABLE I

Steinthal Grouping	Patients			Clinical Cures Per Cent
	Treated	Cured	Lost	
I	21	20	1	95.2
II	41	28	13	68.2
III	44	8	36	18.1

Another analysis is presented in Table II. The cases comprising Groups I and II of the Steinthal classification are combined here in order to avoid small figures.

TABLE II

After Treatment Years	Steinthal Grouping	Patients		Clinical Cures Per Cent
		Treated	Cured	
3	I and II	62	48	77
3	III	44	8	18.1
4	I and II	47	31	65.9
4	III	36	3	8.5
5	I and II	35	17	48.5
5	III	11	2	18.8
6	I and II	28	9	32.1
6	III	10	1	10.0
7	I and II	15	3	20.0
7	III	4		

As regard Group III, the favorable percentage shown is not as a rule found in surgical statistics. The results shown under Group II are better than the average results found in surgical statistics. In Group I there is undoubtedly an ideal ground for competition between the surgical and roentgen treatments. Only the statistics of the best surgeons, however, should be taken into consideration. The author believes that if satisfactory results are to be obtained three years after conclusion of treat-

ment, the roentgen treatment alone is not sufficient.

The author is no longer of the opinion that prophylactic treatment should be given soon after operation. One should wait until nodules on the skin or gland metastases give pronounced indications for treatment. If no such indications occur, the author waits six to eight months after operation and then administers a dose of 90 to 100 per cent of a skin unit to the whole region involved. It happens not infrequently that shortly after operation and in consequence of it, the cancer is spread through the body by the circulation and that metastatic nodules and vertebral metastases develop. If, in fact, such infection has taken place, then roentgen treatment is useless and the patient dies of multiple metastases whether treated by roentgen rays or not. One might object that the period of waiting until symptoms of secondary deposits appear might be dangerous, because in that time the cancer cells might have opportunity to spread and because recurrences or metastasis might be so slight that the usual methods would not suffice to disclose them. Whether these objections are justified remains to be determined.

WINTZ, HERMANN. Experience with the roentgen treatment of carcinoma. *Strahlentherapie*, 1926, xxi, 368-379.

In carcinoma therapy two different aspects should be considered: one is the roentgen irradiation which is intended to destroy the carcinoma cells; and the second is the treatment of the carcinomatous individual, which has two aspects, namely, (a) the local treatment at the site of the carcinoma, and (b) the general treatment of the whole body. The destruction of the carcinoma cell by roentgen rays is a physical problem which is of course guided by medical knowledge. The local and general treatment of the body is a biological problem involving primarily reconstruction.

In the irradiation of carcinomas, the author has always aimed to administer the full dose at one sitting and has used divided doses only when the apparatus available did not permit administration of the full dose. Division of a certain dose over a period of several days means a diminution of the biological effect. The latter statement may now be regarded as a law because it has so often been demonstrated that its truth can no longer be doubted. The best example of this is the castration dose. If the dose of 34 per cent of the skin unit is administered over eight days instead of at one sitting, one finds that ovarian function is not eliminated. It is only when the eight day dose is increased to 50-52 per cent of the skin unit that an effect is obtained equal to that of a single application of 34 per cent of the skin unit.

Local treatment is to be employed only in very special cases. Experience has shown that in general, the irradiated tumor should be allowed to regress without disturbance. Irritation should be avoided and experience has likewise shown that inflammations must be controlled if a successful treatment of the cancer is to be hoped for. The author believes that electrolysis and cataphoresis to produce a deep antiseptic with copper is a valuable aid.

General treatment of carcinoma should support reconstruction and restitution. Although there is no single means that can be recommended without reserve, the employment of arsenic and general clinical factors for improving the bodily condition are very important. Residence at high altitudes appears to be an adjuvant to roentgen therapy that should not be overlooked.

Recent experience shows that 15 per cent of cases of carcinoma appear to succumb to the disease despite the most favorable conditions to cure, such as early diagnosis, early treatment, excellent physical condition of the host, etc. For the present we possess no prognostic signs which will detect these individuals in whom apparently a dissemination of the carcinomatous condition occurs almost simultaneously with the appearance of the local tumor. It is evident, therefore, that one cannot expect 100 per cent cures and that the limit should lie at 85 per cent. The major portion of the cases treated by the author were cases of carcinoma of the uterus, 800 of the cases having been observed five years after conclusion of treatment. By deep roentgen treatment and accompanying after treatment about 60 per cent of operable carcinomas of the portio vaginalis can be controlled; and in inoperable cases the number was from 10 to 14 per cent five years after completion of treatment. For the whole series this corresponds to an absolute cure of about 20 per cent.

The radiation treatment of mammary carcinoma does not show up so favorably at present as the radiation treatment of carcinoma of the portio vaginalis, and there are authors who deny the right of the roentgen therapist to treat operable mammary carcinoma exclusively with roentgen rays.

A summary is presented of the three-year cures after exclusive surgical treatment in various clinics. These show 68 to 100 per cent cures in Group I, 19 to 43 per cent in Group II and 0 to 29 per cent in Group III (the groupings referring to the Steinthal classification of mammary carcinomas). The author obtained 95 per cent three-year cures in 21 cases in Group I; 68 per cent of 41 cases in Group II and 18 per cent of 44 cases in Group III. Combining Groups I and II he obtained

77 per cent three-year cures, 66 per cent four-year cures, 49 per cent five-year cures and 32 per cent six-year cures. The figures given include all the cases without subtraction of those dying of intercurrent disease. If the latter had not been included the five-year cures would have amounted to 63 per cent. The author is no longer sure of the value of irradiation promptly after operation in mammary carcinoma. It appears more advisable to wait for five or six months after operation to administer postoperative roentgen treatment or when a skin metastasis indicates the need for it. This opinion seems to be confirmed by the author's statistics. Prophylactic treatment after a radical operation yielded 57 per cent of three-year cures, while the primary irradiation of mammary carcinoma in Groups I and II of Steinthal yielded 77 per cent.

There is at present no longer any doubt as to the justification for an exclusive irradiation of carcinoma of the uterus with roentgen and radium rays. As regards mammary carcinoma, the conditions are much more complicated, while in uterine carcinoma the primary mortality is very high and the end results from operation are less satisfactory, we find on the other hand, in early mammary carcinoma the operative mortality is extraordinarily low and the permanent results obtained by all prominent surgeons are quite excellent. Consequently if roentgen therapy is to compete with operation the permanent results attained by surgery would have to be equalled at least. The author has indicated that exclusive radiation therapy of mammary carcinoma in operable cases can be made to yield the desired results. There is need, however, for a more extensive series of cases before the fact can be considered demonstrated.

LENTZE, F. A. Gallstones and gall-bladder carcinoma. *Beitr. z. klin. Chir.*, 1926, cxxxvii, 38-62.

A statistical analysis of the reports from various clinics shows an undoubted causal relationship between gallstones and carcinoma of the gall-bladder. The figures, however, do not permit a conclusion as to which of the conditions is the primary one. Even though such a proof is absent nevertheless the probabilities are all in favor of the idea that the gallstones appear first.

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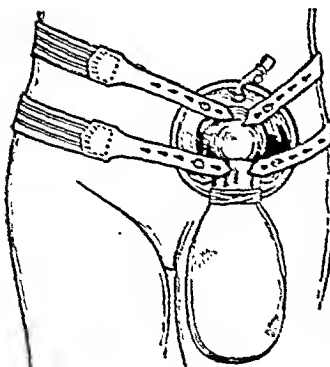
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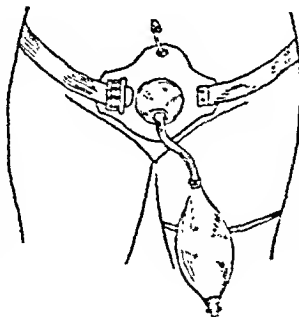
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ASHCROFT, G. V. Renal rickets. *J. Bone & Joint Surg.*, April, 1926, viii, 279-291.

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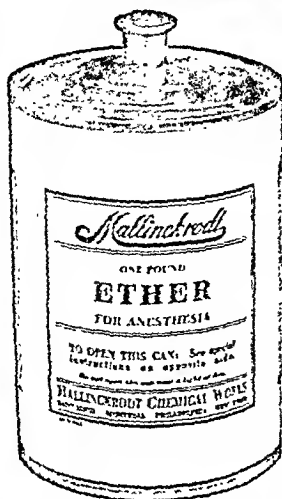
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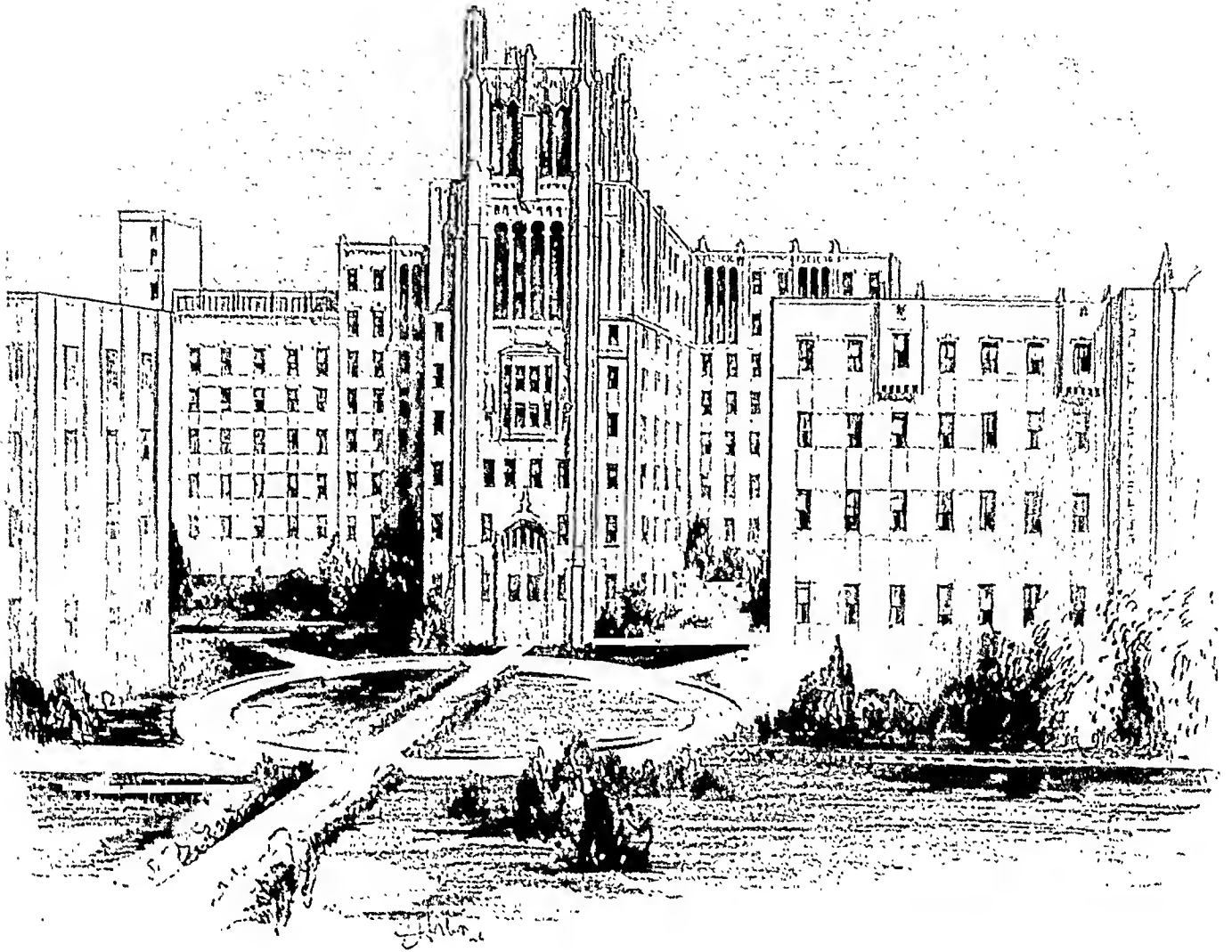
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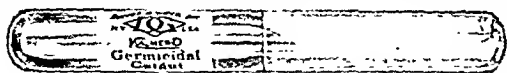
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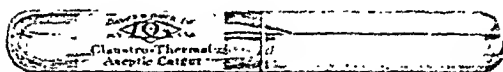
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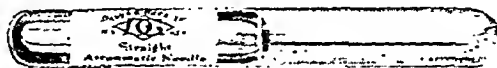
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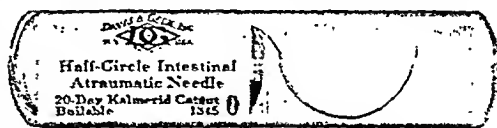
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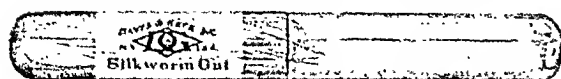
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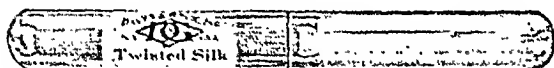


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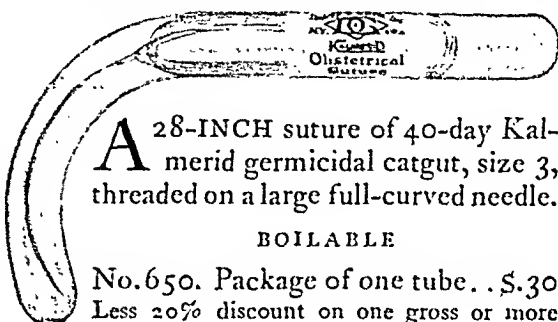
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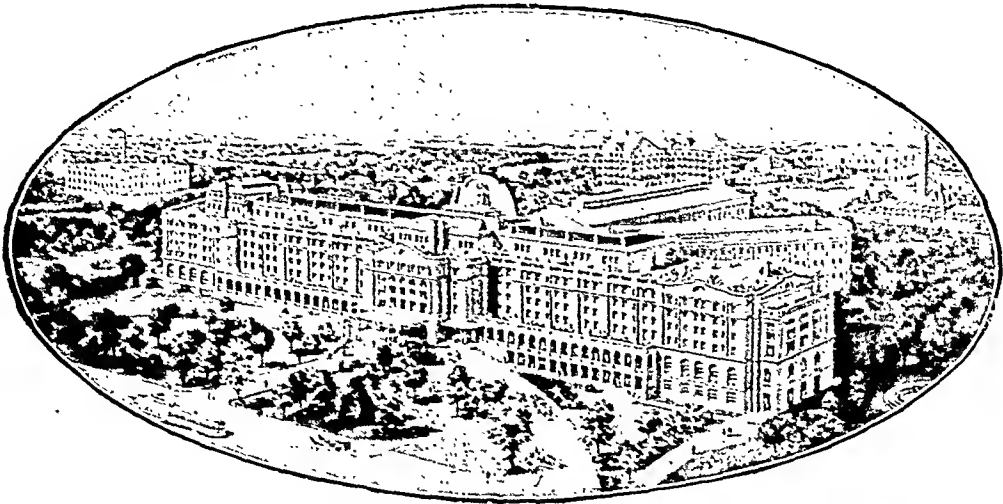
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cent were alive three years, and 27 per cent were alive five years or more. In the postoperative group without gland involvement 81 per cent were alive three years and 77 per cent were alive five years or more. In the postoperative group with gland involvement 56 per cent were alive three years, and 38 per cent were alive five years or more.

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In the local recurrent operable group, there were 60 per cent alive three years and 54 per cent alive five years or more. This observation is important to contrast with the usual experience of fulminating recurrences and metastases which are so frequent after excision.

It is impossible to judge the value of a technique by statistics unless the cases are most carefully classified according to the degree of malignancy and the extent of the disease. The tables and charts show a general improvement in end results corresponding to the improvements in equipment and technique during the past few years. The authors are convinced from their clinical observations that the present technique with high voltage and filtered rays is giving better results than have ever been obtained before.

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No. 2

## DEEP ROENTGEN-RAY AND RADIUM THERAPY IN MALIGNANT DISEASE OF THE GENITOURINARY TRACT\*

HUGH H. YOUNG, M.D., F.A.C.S., AND CHARLES A. WATERS, M.D.

BALTIMORE, MD.

**A**LTHOUGH the literature on this subject is quite extensive, no recent articles have appeared dealing in a comprehensive way with the various advances that have been made in the use of deep roentgen-ray and radium therapy in the field of

based, the therapeutic effects, the technique to be employed and the results that may be expected. We realize that the instruments described will in all probability be replaced by others more perfect in the near future, but much progress has really been made in the standardization of instruments, tech-

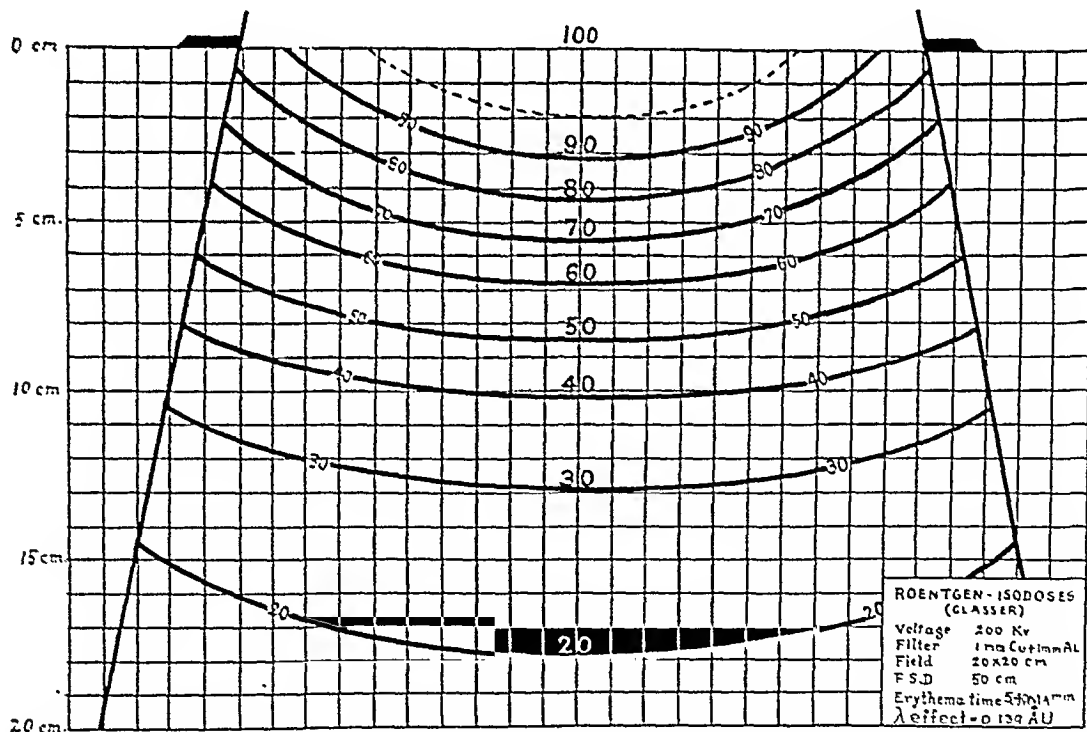


FIG. 1. Glasser's isodoses chart with portal of entry 20 by 20 cm. Note that at a distance of 10 cm. below surface the absorption is about 42 per cent.

urology. We have attempted to present here a complete discussion of the subject, the scientific principles upon which it is

nique and results. We shall, therefore, attempt to set out here as briefly as possible the present status of this new field of therapy.

\* From the James Buchanan Brady Urological Institute, Johns Hopkins Hospital.



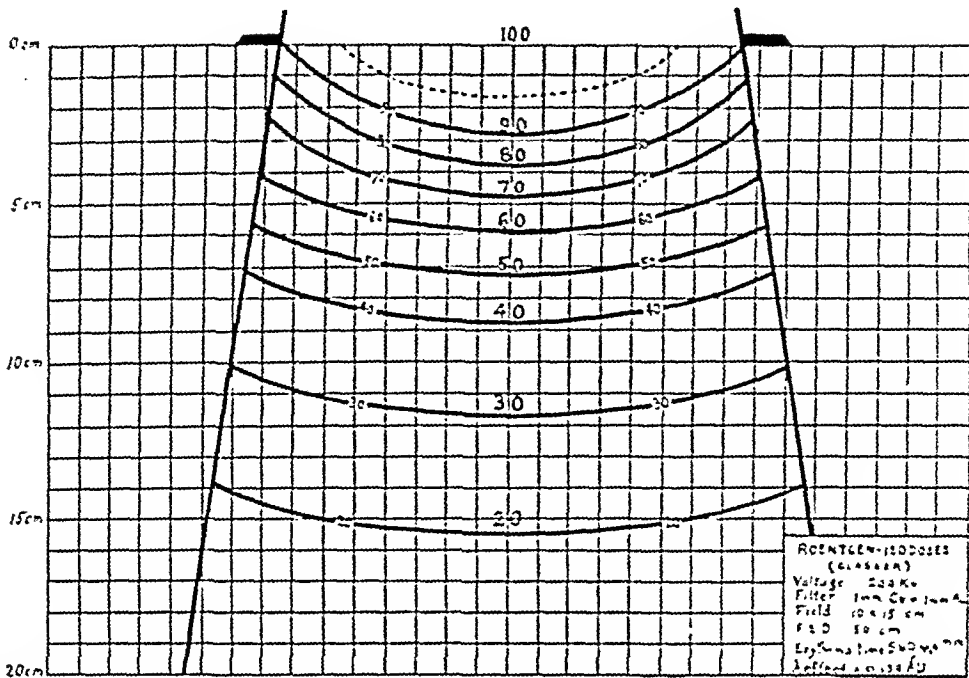


FIG. 2. Glasser's isodoses chart with portal of entry 10 X 15 cm. Note that at a distance of 10 cm. below surface the absorption is about 36 per cent.

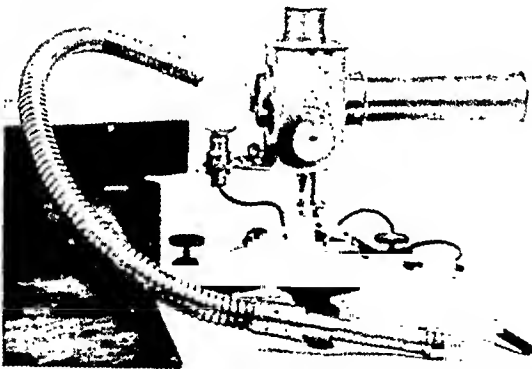


FIG. 3. Bachem Ziehn iontoquantimeter. (For a complete and full description of this instrument, see Albert Bachem's "Principles of X-ray and Radium Dosage," Chicago, 1923, p. 78.)

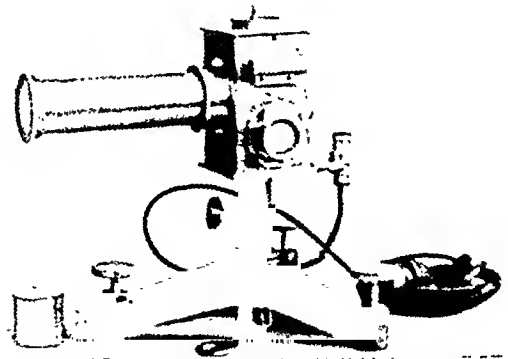
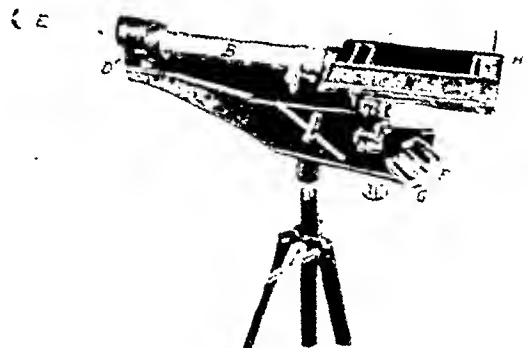
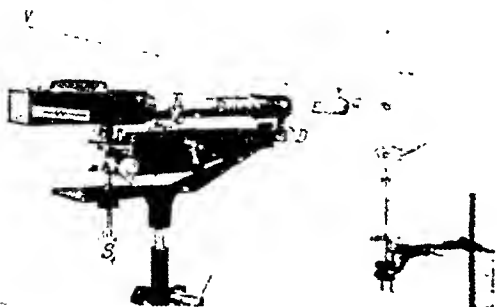


FIG. 4. Bachem Ziehn electroscope. (For a full description, see Albert Bachem's "Principles of X-ray and Radium Dosage," p. 74.)



FIGS. 5 and 6. Two views of the Seeman spectroscopic instrument. A good description of this instrument will be found in Hirsch's "Principles and Practice of Roentgen Therapy," N. Y., 1925, p. 137.

## DEEP ROENTGEN-RAY THERAPY

Not until the work of Kroenig and Friedrich<sup>1</sup> and the subsequent work of Glasser, Korner, Bender and Huth could deep roentgen-ray therapy be administered with comparative safety. Many other investigators have contributed invaluable information upon the subject—Dessauer, Holfelder, Siemen, Duane, Solomon, Wood, Failla, Glasser, Wintz, Bachem, Seitz, Fuerstenaue, Gauss, and many others.

Any method that is adopted to give roentgen-ray treatments must be subjected to repeated tests. Up to the advent of the so-called deep radiation, the dosage was expressed in terms of the degree of skin erythema, and while this still holds true to a certain degree, it alone is not the important guide to the correct dosage.

To arrive at the correct dosage, two physical factors of the roentgen-ray tube and machines must be determined, namely, quality and quantity. We shall not discuss

For our measurements we employed the iontoquantimeter of Bachem Ziehn, the

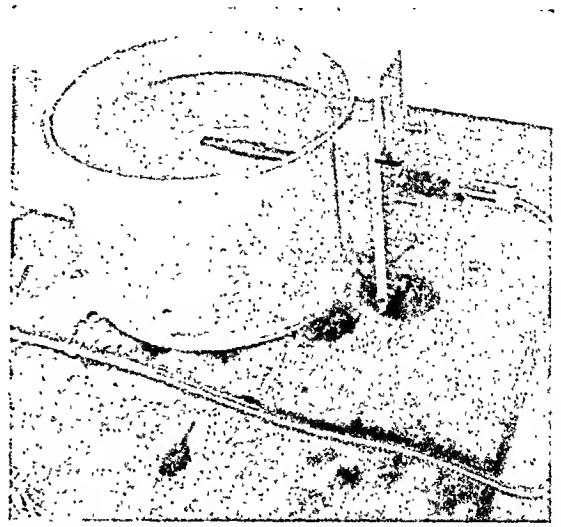


FIG. 7. Friedrich's water phantom for measuring the absorption at different levels of water.

Bachem Ziehn electroscope and the Seeman spectrograph.

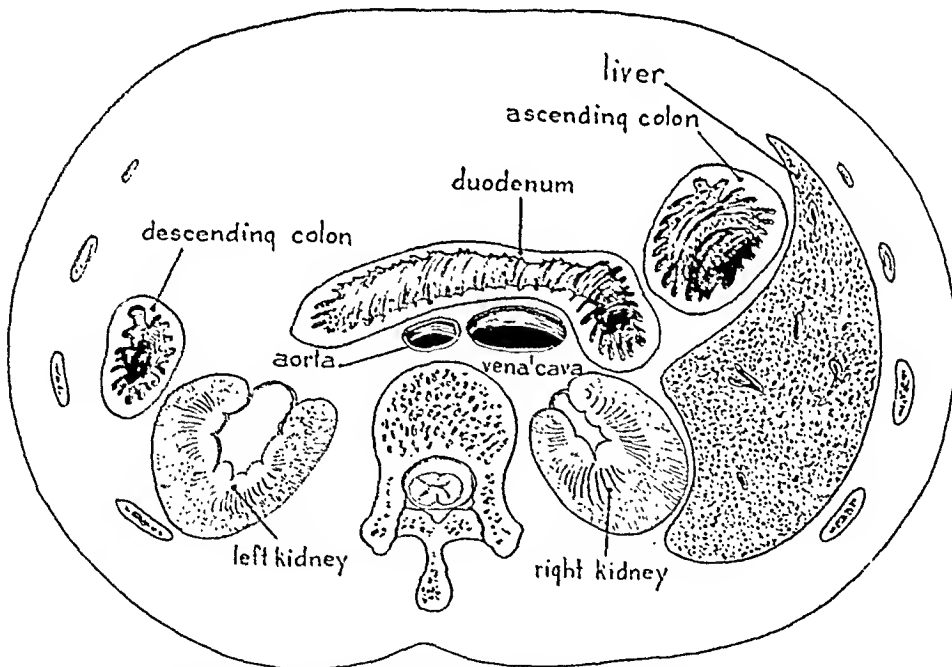


FIG. 8. Anatomical cross-section and contour chart of the human trunk through the kidney, which we have employed in estimating our doses.

the physics of these important factors, as the numerous textbooks and articles dealing with this phase of radiation therapy clearly explain these points.

<sup>1</sup>Die Physikalischen und Biologischen Grundlagen der Strahlentherapie.

## ISODOSES CHARTS

Isodoses charts (Glasser), shown in Figures 1 and 2, represent the amount of radiation absorbed in the tissues at various levels. With the instruments above described, namely, the iontoquantimeter

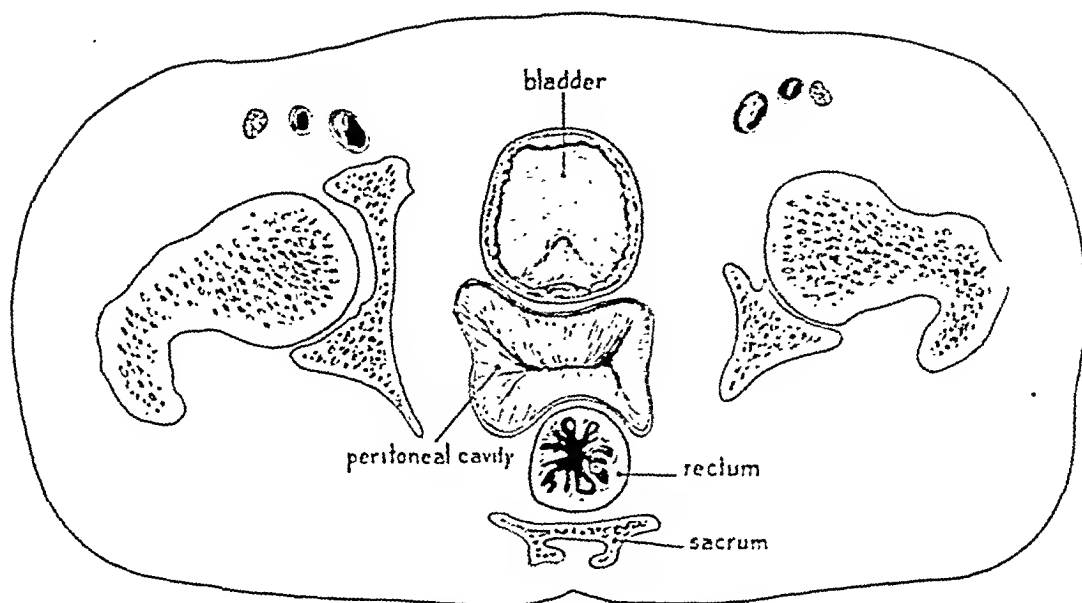


FIG. 9. Anatomical cross-section and contour chart of the human trunk through the bladder.

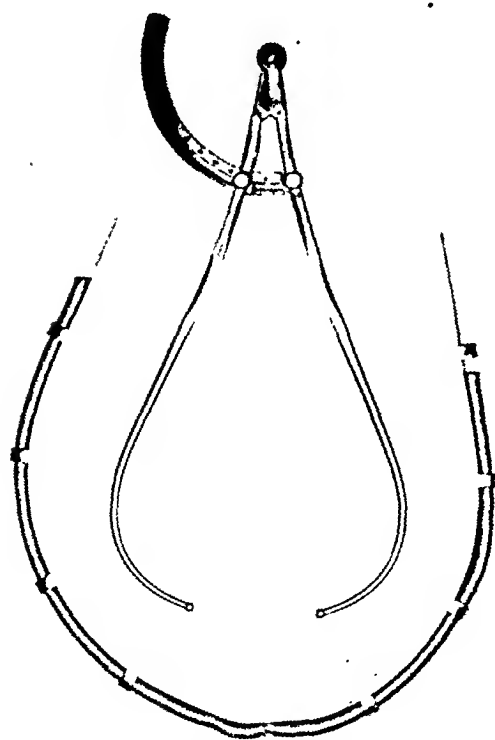


FIG. 10. Obstetrical calipers which are used in conjunction with lead strips for outlining shape of body in the region to be treated.

quality and quantity of roentgen radiation can be accurately determined at different levels of the body. For our measurements, we have employed a water phantom (Fig. 7).

Knowing the voltage generated and passed through the tube, the unknown factors, hardness and quantity, can readily be computed. These conditions are then put down in the form of charts, as shown in Figures 1 and 2.

These charts show the intensities at various centimeter levels in the body, using various types of radiation, different size portals of entry and filters of varying thickness.

*Technique of Application.* After ascertaining the above-mentioned factors and in order to give accurately a series of deep roentgen-ray treatments, one must go a step further and apply the isodoses charts to the patients to be treated.

For this purpose, contour and cross-section charts of the body must be used (Figs. 8 and 9). With the assistance of calipers, flexible lead strips (Fig. 10) and centimeter-ruled charts, the location and extent of the lesion must be determined and outlined on these charts.

(Fig. 3), the electroscope (Fig. 4) and the spectroscope (Figs. 5 and 6), the

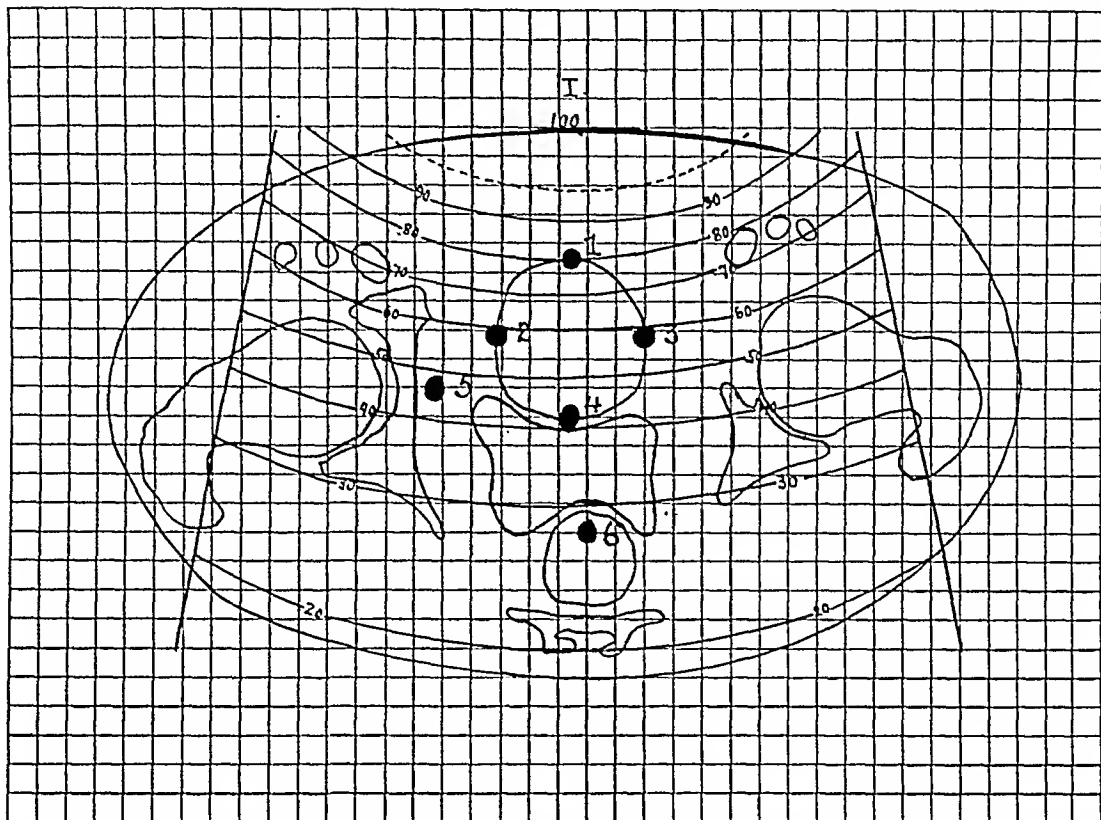


FIG. 11. Shows the isodoses curves drawn onto the cross-section anatomical charts. We have indicated by black dots the areas where the dosage is to be computed. Comparing these superimposed charts with the original cross-section drawings, one can easily obtain a clear idea of the areas treated. The radiation is directed through the front in this chart.

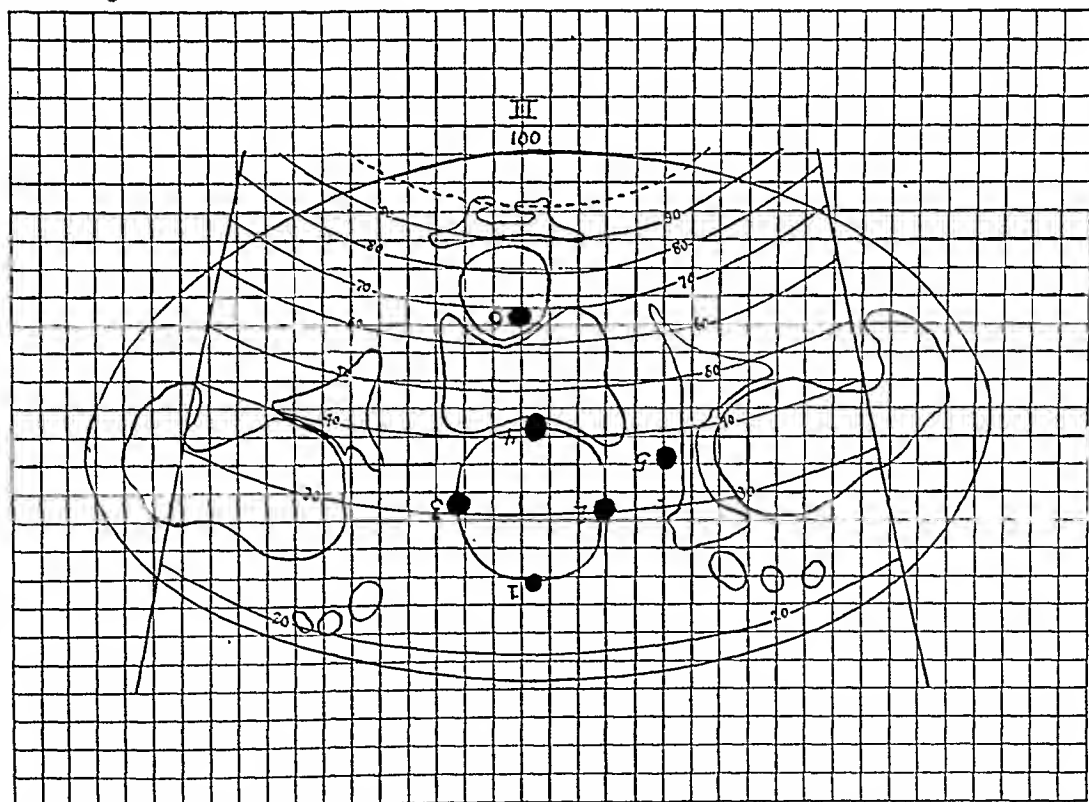


FIG. 12. Shows the isodoses curves drawn onto the same cross-section charts when the treatments are given over the sacrum. One can easily see at a glance that the anterior bladder wall now only receives about 22 per cent, whereas when treated through the front it received over 75 per cent.

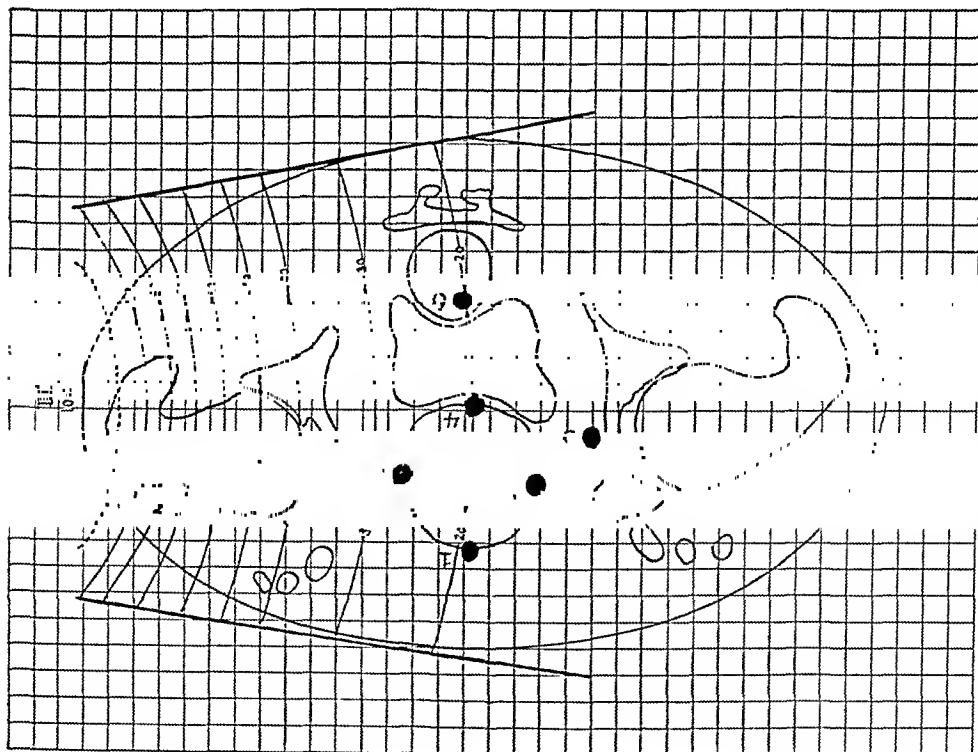


FIG. 13. Shows the treatments given through the right side. In this manner the anterior bladder wall received less than 20 per cent.

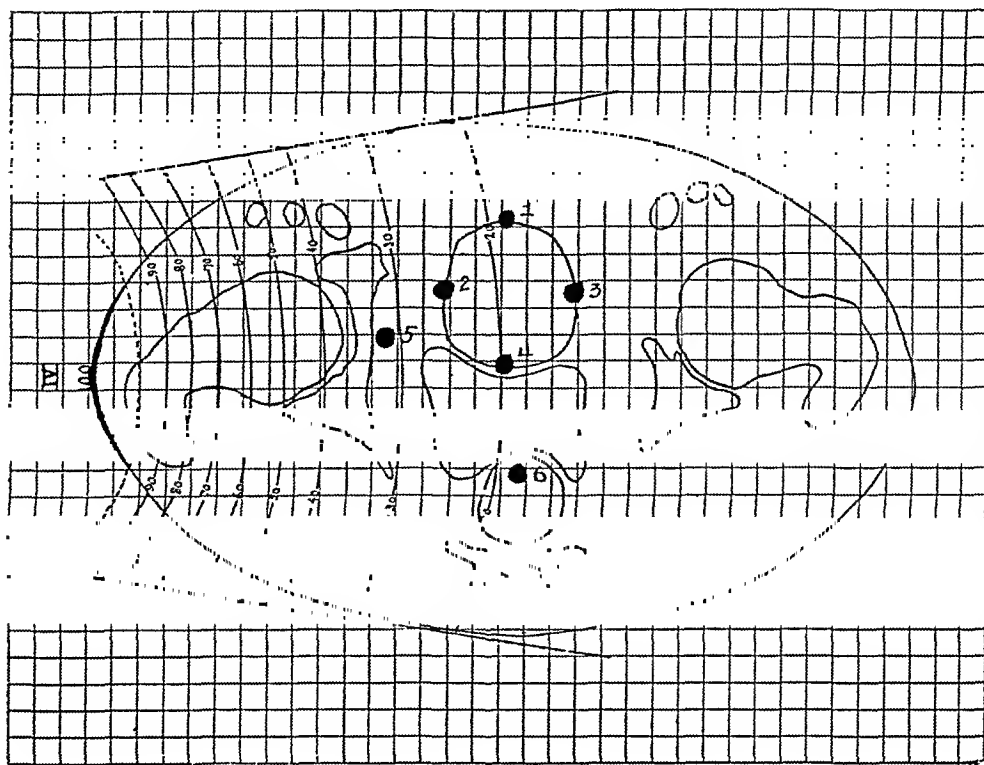


FIG. 14. Shows the treatments given through the left side. The anterior bladder wall receives a similar dose as when given through the right side.

Using this method, we have attempted to give tumors of the bladder, carcinoma of the prostate, renal neoplasm, and testicular tumors with abdominal metastasis a depth dose of 130 per cent. In Figures 11, 12, 13 and 14 are shown a combination of isodoses charts, superimposed upon anatomical cross-section charts through the bladder on centimeter-ruled sheets. One can see at a glance that by giving a full erythema dose over the front, a depth dose at 10 cm. of about 42 per cent is obtained. By giving the same technique through the back and both sides it is possible to give 135 per cent to a given spot.

TABLE A  
THE AMOUNT OF RADIATION GIVEN IN A CASE OF AN INFILTRATING PAPILLARY CARCINOMA OF THE BLADDER

Portals of Entry	Treated Areas in Different Sections of Tumors					
	1	2	3	4	5	6
20 X 20 cm. front.....	78	60	60	42	49	28
20 X 20 cm. back.....	22	30	30	42	37	65
10 X 15 cm. right side.....	17	15	28	22	13	22
10 X 15 cm. left side.....	17	25	13	20	30	30
Total.....	134	130	131	126	129	135

Employing: 20 kv. (peak), 4 ma., 1 mm. Cu and 1 mm. Al. F.S.D. 50 cm.  
Time Factors: 135 minutes with 20 X 20 cm. size of field.  
140 minutes with 10 X 15 cm. size of field.

Table A shows the amount of radiation given in a case of carcinoma of the bladder through four portals of entry, the size of which is indicated. As shown here, the amount of radiation delivered in the spot indicated by Star 1 is 73 per cent through the anterior, 24 per cent through the posterior, 20 per cent through the right side, and 20 per cent through the left side, totaling 137 per cent. Similar figures are indicated for other spots indicated by the six stars shown on the cross-section chart. By means of this chart one knows at the end of treatment exactly how much dosage has been given to a given spot. Every effort is made to deliver between 130 and 140 per cent.

TABLE B  
THE AMOUNT OF RADIATION GIVEN IN THE CASE OF A RENAL NEOPLASM

Portals of Entry	Treated Areas in Different Sections of Tumors					
	1	2	3	4	5	6
20 X 20 cm. front.....	48	54	28	27	27	28
20 X 20 cm. back.....	27	26	51	58	60	53
10 X 15 cm. right side.....	57	5	47	29	18	15
10 X 15 cm. left side.....	5	45	5	17	27	35
Total.....	137	130	131	131	132	131

Employing: 200 kv. (peak), 4 ma., 1 mm. Cu and 1 mm. Al. F.S.D. 50 cm.  
Time Factors: 135 minutes with 20 X 20 cm. size of field.  
140 minutes with 10 X 15 cm. size of field.

Table B shows a similar method for recording the amount of radiation given in renal neoplasms.

Tables C, D, E and F show the method by which the deep roentgen-ray treatments are recorded from day to day in a case of bladder tumor. Note that the time factors, voltage, filtration, etc., are put down each day in order to avoid any possible error by giving too many treatments.

**Complications.** One of the most serious complications in deep roentgen-ray therapy is a burn, but by employing the above technique we have been very successful in giving this large dosage without producing a marked burn with necrosis. Notwithstanding that with the above-described method a burn of the skin will not be produced, in a certain number of instances local and systemic reactions, which at times reach large proportions, will occur.

It is a well-known fact that when a patient is exposed to a series of roentgen-ray treatments a cumulative effect is produced, and this should be closely watched for by the urologist and roentgenologist. It has seemed to us that the cumulative effect of roentgen rays upon a patient occurs in direct proportion to his debilitation. Thus, an old man with a papillary carcinoma of the bladder, greatly debilitated from long-continued suffering,

TABLE C

THE METHOD BY WHICH THE DEEP ROENTGEN-RAY TREATMENTS ARE RECORDED  
FROM DAY TO DAY IN A CASE OF BLADDER TUMOR

Name Mrs. T. F. Address Buffalo, N. Y. Age 60 No. 229  
Physician Dr. Hugh H. Young, Address Johns Hopkins Hospital.  
Diagnosis Carcinoma posterior bladder wall involving the right ureteral orifice.

Date	Sept. 1923	9/22/23	9/24/23	9/25/23	9/26/23	9/27/23	9/28/23
Area Treated	1	1	1	1	1	1	2
Duration each treatment	27 min.	27 min.	27 min.	27 min.	27 min.	27 min.	27 min.
Milli Amperes	4	4	4	4	4	4	4
Voltage	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.
Filters	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al
Focal Distance	50 cm	50 cm	50 cm	50 cm	50 cm	50 cm	50 cm
Portal Entry	20-20 cm	20-20 cm	20-20 cm	20-20 cm	20-20 cm	20-20 cm	20-20 cm
Tube	D.T.	D.T.	D.T.	D.T.	D.T.	D.T.	D.T.
Photograph							
Roentgenogram							
Chart							

Remarks

TABLE D

THE METHOD BY WHICH THE DEEP ROENTGEN-RAY TREATMENTS ARE RECORDED  
FROM DAY TO DAY IN A CASE OF BLADDER TUMOR

Name Mrs. T. F. Address Buffalo, N. Y. Age 60 No. 229  
Physician Dr. Hugh H. Young, Address Johns Hopkins Hospital.  
Diagnosis Carcinoma posterior bladder wall involving the right ureteral orifice.

Date	9/29/23	10/1/23	10/2/23	10/3/23	10/4/23	10/5/23
Area Treated	2	2	2	2	3	3
Duration each treatment	27 min.	27 min.	27 min.	27 min.	28 min.	28 min.
Milli Amperes	4	4	4	4	4	4
Voltage	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.
Filters	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al
Focal Distance	50 cm	50 cm	50 cm	50 cm	50 cm	50 cm
Portal Entry	20-20 cm	20-20 cm	20-20 cm	20-20 cm	15-15 cm	15-15 cm
Tube	D.T.	D.T.	D.T.	D.T.	D.T.	D.T.
Photograph						
Roentgenogram						
Chart						

Remarks



TABLE E

THE METHOD BY WHICH THE DEEP ROENTGEN-RAY TREATMENTS ARE RECORDED  
FROM DAY TO DAY IN A CASE OF BLADDER TUMOR

Name Mrs. T. F. Age 60 No. 223  
Address Buffalo, N. Y.  
Physician Dr. Hugh H. Young, Address Johns Hopkins Hospital.  
Diagnosis Carcinoma posterior bladder wall involving the right ureteral orifice

Date	10/6/23	10/8/23	10/9/23	10/10/23	10/11/23	10/12/23
Area Treated	3	3	3	4	4	4
Duration each treatment	28 min.	28 min.	28 min.	28 min.	28 min.	28 min.
Milli Amperes	4	4	4	4	4	4
Voltage	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.	200 K.V.
Filters	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al	1 mm cu 1 mm al
Focal Distance	50 cm	50 cm	50 cm	50 cm	50 cm	50 cm
Portal Entry	15-15 cm	15-15 cm	15-15 cm	15-15 cm	15-15 cm	15-15 cm
Tube	D.T.	D.T.	D.T.	D.T.	D.T.	D.T.
Photograph						
Roentgenogram						
Chart						
Remarks						

TABLE F

THE METHOD BY WHICH THE DEEP ROENTGEN-RAY TREATMENTS ARE RECORDED  
FROM DAY TO DAY IN A CASE OF BLADDER TUMOR

Name Mrs. T. F. Age 60 No. 223  
Address Buffalo, N. Y.  
Physician Dr. Hugh H. Young, Address Johns Hopkins Hospital.  
Diagnosis Carcinoma posterior bladder wall involving the right ureteral orifice.

Date	10/13/23	10/15/23
Area Treated	4	4
Duration each treatment	28 min.	28 min.
Milli Amperes	4	4
Voltage	200 K.V.	200 K.V.
Filters	1 mm cu 1 mm al	1 mm cu 1 mm al
Focal Distance	50 cm	50 cm
Portal Entry	15-15 cm	15-15 cm
Tube	D.T.	D.T.
Photograph		
Roentgenogram		
Chart		
Remarks		

requires more careful watching during the course of his deep roentgen-ray therapy than would a younger and stronger man.

rectal burning and tenesmus. Repeated examinations of the blood should be made to determine the effect upon the white

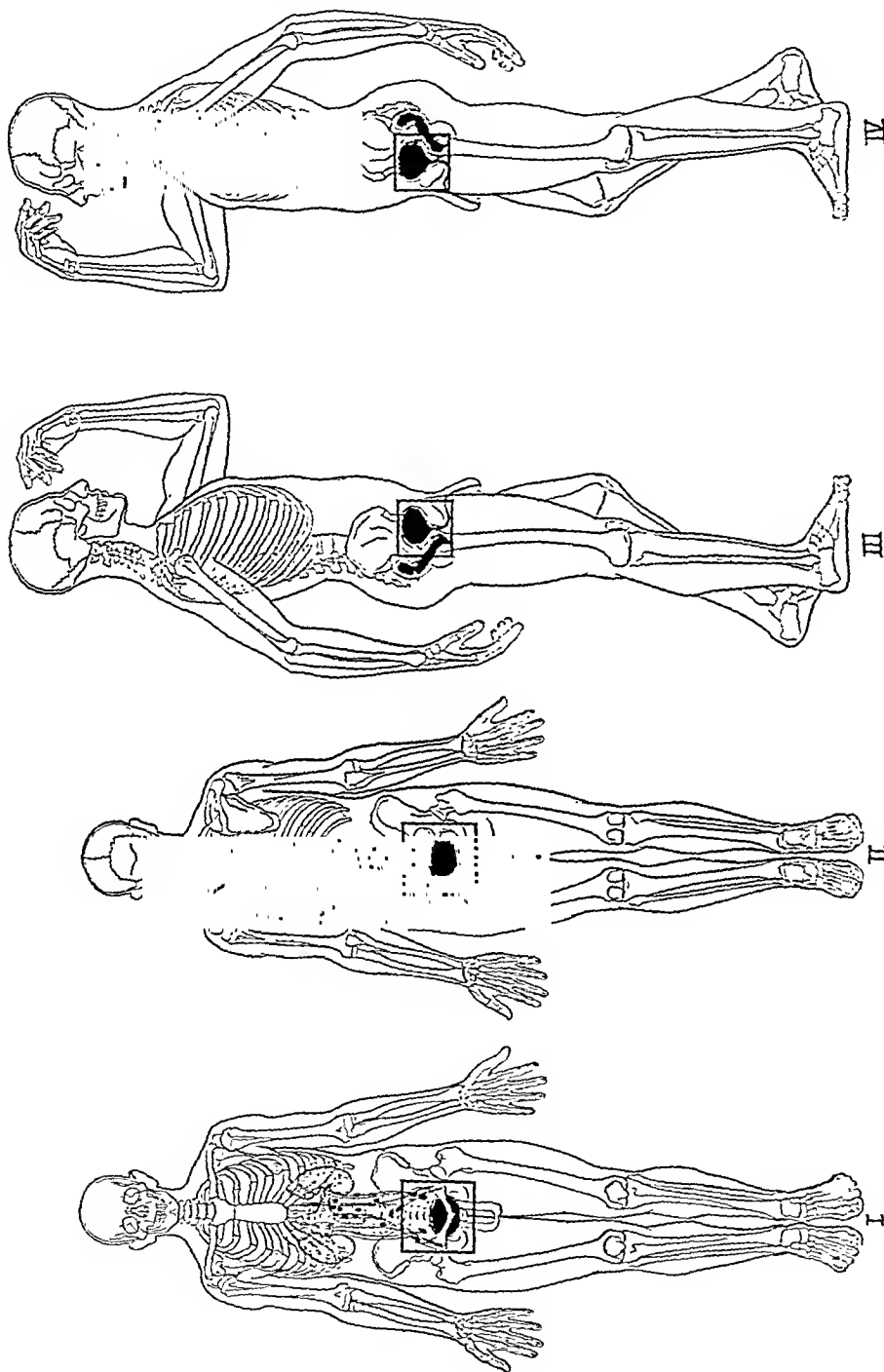


FIG. 15. FIG. 16. Figures 15 and 16 are osteological charts by Didusch upon which we have indicated the location of the bladder, prostate, rectum, kidneys and deep aortic lymphatic glands as viewed from the front, back and each side. They give a clear relative position of these organs. A set of these charts is used in the treatment of each case and the area treated is signified by numbers as illustrated in the case shown in Tables C, D, E and F.

Among the earliest symptoms of radiation intoxication may be mentioned nausea, vomiting, prostration, diarrhea,

blood corpuscle count, in particular, though counts of the red blood cells and hemoglobin estimations should also be made.

The number of white blood cells is reduced much more rapidly following radiation than is that of the red cells. It is rarely safe to treat a patient further when his white count has fallen below 4000.

The necessity for careful and close co-operation of the urologist with the roentgenologist is, therefore, obvious. Many of the ill-effects could be avoided if the roentgen-ray treatments were more closely observed by the roentgenologist and the urologist and not left so largely to mere technicians.

Despite the disturbing reactions that are not wholly avoidable, the relief afforded to two symptoms of bladder carcinoma, namely, root pains and hematuria, justify the treatment. It is rare that, even when no other benefit is obtainable, these two distressing symptoms fail of relief with roentgen-ray therapy.

*Roentgen-ray Treatment of Renal Neoplasm.* The results in deep roentgen-ray therapy are based on the treatment of 20 cases, divided as follows: hypernephroma without metastasis, 15 cases; hypernephroma with metastasis, 5 cases.

After radical operation for hypernephroma, we have given a dose of 130 per cent around the perirenal fat, adjacent glands and through the lower mediastinum.

It has been our experience that metastases from hypernephroma more frequently occur in the chest than any other place; yet in some of our cases we have found metastasis in the bones, especially near the entrance of the nutrient vessel. The humeri seem to be particularly prone to this type of metastasis.

In several cases in which radical removal was thought impossible or inadvisable, we radiated the kidney region first with the hope that by shrinking or partly destroying the tumor, radical removal might be possible later, with the result that in every instance at least a great diminution in the size of the tumor was noted. One patient lived two years. There were no symptoms of a recurrence,

and no palpable mass was to be made out.

Pain, probably due to pressure, is often greatly benefited in this group of cases.

*Bladder tumors.* So far we have treated 130 cases of bladder tumors with deep roentgen-radiation. These cases are divided as follows: papillomas, benign and malignant; non-infiltrating papillary carcinomas, and infiltrating carcinomas, superficial and deep.

By a combination of fulguration with the intravesical application of radium to the surface of tumors, on the one hand, and by destruction of the carcinoma with the cautery after suprapubic incision, on the other hand, about 75 per cent of tumors can be destroyed. This leaves about 25 per cent of hopeless tumors that occupy positions that render them inoperable or involve such extensive areas of the bladder wall that neither surgery nor intravesical radium treatments offer any chance of success.

It is quite clear that there still remain many cases unsuitable for fulguration, for intravesical radium treatments, for resection or for treatment with radium needles.

By the combination of radium with roentgen-ray treatment, as above outlined, many of these tumors can be destroyed with a minimum amount of damage to the bladder, and in many instances with but little or no irritation of the bladder mucosa. When the growth is an infiltrating carcinoma, but still operable, we believe that radical resection should be carried out, since it offers the greatest chance of complete cure.

Twenty-five per cent of the infiltrating growths in our series occupy a position that renders them inoperable, or they are so extensive that radical removal is impossible. In this group, when it is possible to apply radium directly to the growth, both radium and deep roentgen-ray treatments should be given a trial, for in a certain number of the cases favorable results can be obtained by this method alone. But in cases in which this procedure does not yield the results hoped for or in cases in

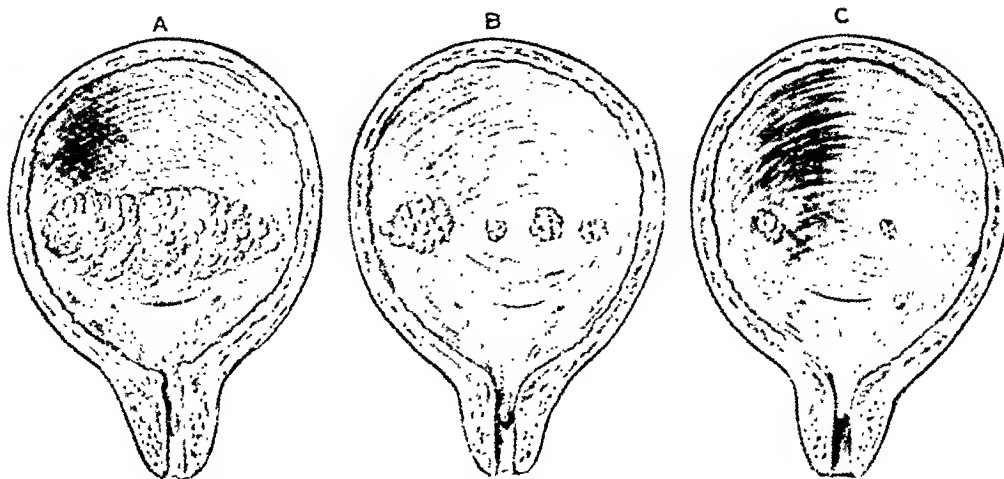


FIG. 17. E. W. C., aged seventy-three. This patient came to the hospital in May, 1923, complaining of frequency and bleeding. Cystoscopic examination revealed a large papillary carcinoma as shown in drawing A. He was given a 130 per cent dose of roentgen rays along with 800 mg.-hr. radium intravesically. The tumor promptly responded to radiation and in ten days' time was found to be made up of four separate tumors, as shown in drawing B, which had superficially fused. Drawing C shows the condition of the tumor when the patient was discharged, with the understanding that he was to report for observation in one month. This patient also has a tumor transplant in the posterior urethra, as shown in the illustration. The patient did not return for examination, but was still alive in May, 1926, three years after treatment.

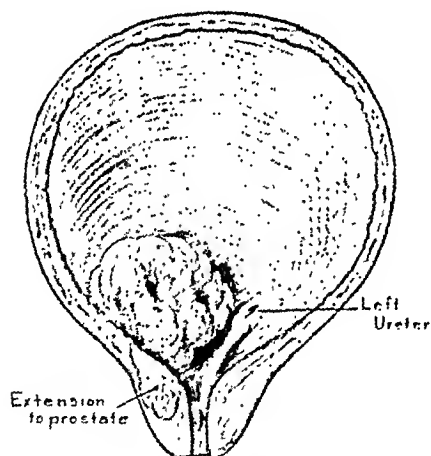


FIG. 18. P. G., B.U.I. 12003, aged sixty-two years, married, admitted December 13, 1923, complaining of hematuria of six months' duration. Prostate was indurated on the right side. Cystoscope showed large, globular, ulcerated, infiltrating carcinoma of right half of trigone, involving prostatic orifice. Patient was treated by radium applications through the bladder and through the rectum, 1400 mg.-hr. He also received deep roentgen-ray therapy. Ultimate result: tumor completely disappeared and also infiltration of prostate. Cystoscopy showed no tumor present. Two years later patient died of metastases.

which one feels that the growth is sufficiently localized to warrant implantations of

radium needles, the bladder should be opened suprapubically and screened radium needles should be implanted throughout the tumor. Within the past few years, diathermy has been used in a number of clinics. Our experience with this form of therapy is too recent to warrant any definite conclusions.

Finally, the great tendency to recurrence of tumors of the bladder, following their apparent destruction, either by fulguration, radiation or deep roentgen-ray treatment, makes it imperative that patients return at frequent intervals for cystoscopic examinations. In a number of our cases, in which recurrences ultimately resulted in death, complete cures might well have been obtained had these individuals returned regularly for observation and treatment before the recurrences had become too extensive. In a few cases, where the patients have returned for observation, the recurrences, when found, have responded well to radium alone. This is especially true of the non-infiltrating papillary carcinomas. Even in cases that are incurable, regardless of the therapy employed, deep roentgen-ray treatment

is an excellent palliative measure, in that it tends to control hemorrhages and to decrease nerve root pains.

Illustrative cases are appended (see Figs. 17-20). The histories have been stated briefly in the legends. As indicated in these legends, in all these cases the results of combined radium and deep roentgen-ray therapy have been complete removal of the tumor mass. In some cases there has resulted apparent cure, the

enlargement, and to obtain relief from obstruction and other symptoms by means of deep roentgen-ray therapy and radium treatment. A very few encouraging reports have been made. Young reported a case of prostatic hypertrophy in a man with very severe cardiac disease where use of radium and deep roentgen-ray therapy caused shrinkage of the gland to such small dimensions that it was possible, by means of the punch operation, to remove the

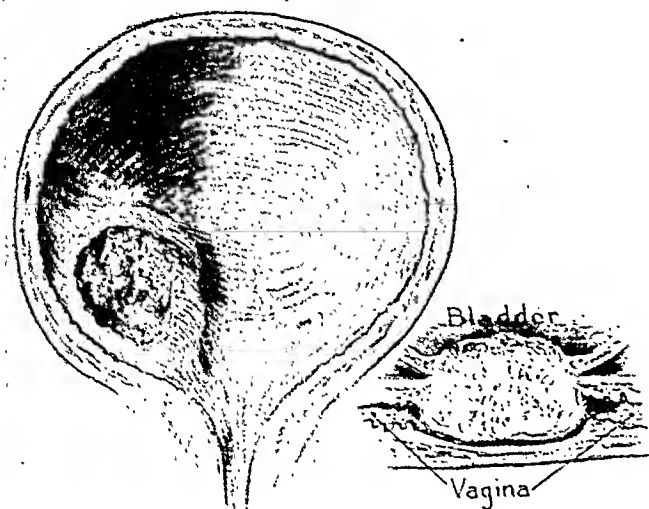


FIG. 19.

FIG. 19. Mrs. I. M. F., B.U.I. 11984, aged sixty years, married, admitted September 19, 1923, with history of hematuria for three years. Cystoscopy showed large, infiltrating, papillary carcinoma of right half of bladder, involving region of right ureter. On vaginal examination marked infiltration of the vagina was made out. Patient was treated by intravesical applications of radium and received 900 mg.-hr. She also received deep roentgen-ray therapy, 130 per cent. The result of this treatment was complete disappearance of the tumor, and infiltration and induration between vagina and bladder disappeared. Subsequently suprapubic cystostomy was done for ulcer of bladder; scrapings were removed. Microscopic examination showed no carcinoma. Report by letter almost three years later states that patient is entirely well and that urination is normal.

FIG. 20. B. U. I. 11966. L. T. H., aged sixty-one years. Cystoscopic examination in December, 1923, reveals the above findings, namely, a large papillary, infiltrating carcinoma involving the right side of the bladder and right ureter with induration into the vagina. This patient was given 700 mg.-hr. of radium through the urethra, 100 mg.-hr. per vagina and 130 per cent deep roentgen dose without producing any change in the tumor whatsoever. While this case is almost identical with that shown in Figure 19, both women, both practically the same age, tumors of the same type, location and size, one was cured and the other not affected.

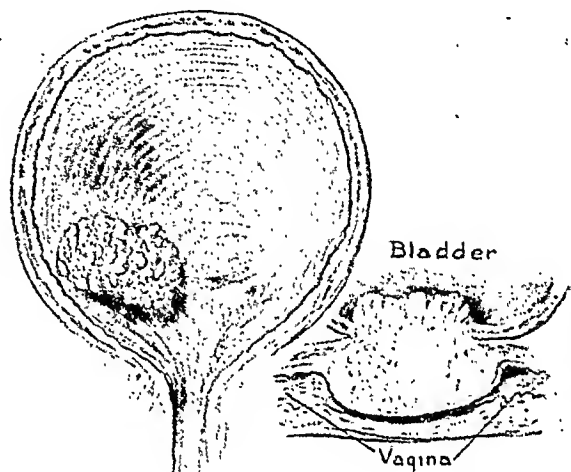


FIG. 20.

patient being still alive; in others the tumor has been destroyed, but the presence of ulcer makes it impossible to say whether this is due simply to treatment or indicates persistence of the malignant disease. In all cases, however, marked benefit has resulted from the treatment.

**Benign Prostatic Hypertrophy.** There are many cases in which operative treatment of prostatic hypertrophy is attended with so much risk that many attempts have been made to cause shrinkage of the

obstruction and relieve the frequency of urination. In other cases the treatment has been completely unsatisfactory in our hands, and the consensus of opinion now is that roentgen-ray therapy is of little or no value in prostatic hypertrophy. Hematuria is often wonderfully affected, and not infrequently one application of radium to the urethra or one exposure to deep roentgen rays will cause cessation of the bleeding.

**Carcinoma of the Prostate.** As stated

elsewhere, the plan followed in the treatment of carcinoma of the prostate has been as follows: 1, radical operation when there was a chance of a cure; 2, application of radium to the prostate through perineal or suprapubic wounds in cases where the chance of cure by this method seemed possible; 3, application of radium through the rectum to prostate, seminal vesicles and pelvic glands; through the urethra to the periurethral prostate; 4, through the bladder, by means of an applicator passed through the urethra, the beak containing radium being held firmly against the trigone so as to radiate the region involved above the prostate; 5, conservative perineal prostatectomy, if the previous method (4) did not relieve obstruction or pain or hemorrhage. For all types of cases deep roentgen-ray therapy has been employed, applied through portals  $20 \times 20$  cm. in front, in back, and  $15 \times 15$  cm. through the region of the right and left sides. Similar therapy is also applied to the spine where there is evidence of metastases or where pain suggests metastases.

The results of these combined methods have been remarkably satisfactory in many cases, even where the disease was so extensive, and the symptoms of obstruction, hematuria and pain so pronounced that they seemed hopeless. By the use of radium and roentgen ray very great enlargement of carcinomatous infiltration of the prostate and vesicles diminishes so greatly that examination a few months later will often reveal a condition not at all suggesting carcinoma. In fact, we have not infrequently seen the prostate return to practically normal size and consistence. The cessation of hemorrhage is often immediate and deep-seated pain of a very severe character located in the spine, hips, thighs and legs, and due to metastases in the spine and pelvis, generally disappears almost completely. We have records of 122 cases in which deep roentgen-ray therapy was employed, and while we have very few cases in which cures can be claimed, we have a great number in which the

patient was relieved of severe symptoms, and in many instances passed the remainder of his days in comparative comfort.

*Sarcoma of the Prostate.* In two cases sarcoma of the prostate, characterized by huge retrovesical tumor masses, has disappeared completely with a combination of local applications of radium through the rectum and urethra, and deep roentgen-ray therapy. One of these cases has been followed for seven years, and the other three years. The results obtained are, indeed, quite remarkable.

*Tumors of the Testicle.* In our series of cases treated with deep roentgen-ray therapy, there are 12 which were diagnosed as follows: carcinoma, 1; sarcoma, 1; teratoma, 10. Of these 12 cases, 4 showed demonstrable roentgen-ray evidences of metastasis in the lungs. All of these are dead. Two had metastasis in the glands, inguinal and aortic, at the time of operation. Both patients received a full course of deep roentgen-ray therapy and are living at this time, one two years, the other one year after operation.

The remaining six patients in which roentgenograms showed no metastases are still living and free of metastasis, one for six years. In all of these cases, with but one exception, deep roentgen-ray therapy was administered over the abdominal and thoracic aortic glands, the exception being the first case treated in which the older ten-inch type of therapy was employed.

As soon as the patient has sufficiently recovered from the effects of the operation, radiation is started. A depth dose of 130 per cent is given, and is repeated every three months. In one case four series of treatments were given during a period of fifteen months. Repeated observation as to the condition of the blood must be made in order to prevent the development of an aplastic anemia, for which little can be done.

*Carcinoma of the Penis.* In this group are 9 cases: 7 without demonstrable metastases at the time treatment was instituted; 2 with metastases.

All of these cases were vigorously treated with radium applied locally to the growth, and deep roentgen radiation, 130 per cent, given to the deep inguinal glands and base of the penis.

The results in this group have been very discouraging, and all the patients are dead. One lived one year and then died of metastasis in the abdominal glands.

#### RADIUM THERAPY

(In conjunction with roentgen rays or alone)

*The Kidney and Ureter.* As remarked elsewhere, radical operative therapy is the method of choice. The tumor should be removed as thoroughly as possible and in the case of kidney tumors, the perirenal fat, adjacent glands and sometimes the adrenal gland should be extirpated. Where the tumor extends into the ureter, this should be removed to an extent sufficient to be certain that the operation is complete.

After such radical procedure our statistics seem to prove that deep therapy, either with roentgen rays or radium, is indicated, even though the operation has apparently been successful in removing the entire growth and no metastases are shown on roentgen-ray films.

Where it is found at operation that it is impossible to remove all of the malignant tissue, the insertion of radium needles, emanation points, or masses of radium element should be considered. If the veins of the pedicle are deeply involved, if the vena cava contains tumor growths or if the carcinomatous infiltration is so close to the great vessels that the use of radium might be dangerous for fear of causing necrosis and hemorrhage, radium should not be used.

With due care, radium may be inserted into the carcinomatous infiltration in the region of the vascular pedicle with comparative safety, and we have employed it in several cases. We must admit, however, that the results obtained have not been satisfactory.

In perirenal and retroperitoneal tumors, which are generally of a sarcomatous character, the use of radium and deep roentgen-ray therapy is often of great value. We know of one case in which an extensive mass, which had been seen at operation and found to be a huge retroperitoneal perirenal tumor, was treated by roentgen-ray therapy with complete cure. The patient has now been followed for ten years. Other cases of this type in which roentgen-ray therapy has been successful are to be found in the literature. Roentgen-ray therapy may be tried in the huge tumors of infancy and childhood, but so far the results obtained have not been satisfactory, as these tumors seem not to be affected by either radium or roentgen ray.

*Bladder.* Radium particularly has been very effective in the treatment of bladder tumors and is of great assistance in both benign and malignant growths. Paschkis was apparently the first to construct a cystoscopic radium applicator, the description of which he published in 1911. This instrument was first brought to our notice in a publication by Thomas in 1915. It consisted of a straight cystoscope around which there was a sheath having a curved beak provided with a screw top in which the radium was concealed. No provision was made for holding this instrument in any fixed position in the bladder. Since the first brief report no other record is to be found of the use of this instrument, by the inventor or others.

In 1913 Pasteau and Degrais reported (to the 1913 Congress of Medicine in London) cases of cancer of the prostate and bladder in which truly striking results had been obtained by simply introducing radium through a Coudé gum catheter into the bladder or prostatic urethra for an hour. On our return from the Congress we procured 100 milligrams of radium and introduced it in the way they had done. We soon found that it was impossible to apply the radium with any accuracy, and we then set about to devise a cystoscopic



instrument using our No. 15 straight cystoscope which we had employed for several years in our cystoscopic rongeur.

With our simple cystoscopic applicator and the parallelogram instrument, all forms of vesical tumors can be treated with massive doses of radium under direction of the cystoscope, through the unopened bladder and generally very effectively. The most important and entirely new idea in the employment of the instrument is the use of the clamp by means of which the radium is held directly against the desired part of the tumor during the period of treatment, usually for an hour.

the part of the procedure which we consider most important.

Hinman presented an applicator which could be used with the posterior cystourethroscope. Barringer, Buerger and others presented similar instruments for applying radium upon and introducing it into the substance of vesical tumors with needles. In 1915, Kelly and his associates began to employ radium in the treatment of bladder tumors through his air endoscope, and in 1917 we treated a woman with a large carcinoma of the trigone, through our urethroscope, implanting radium emanations with very effective results. In 1922

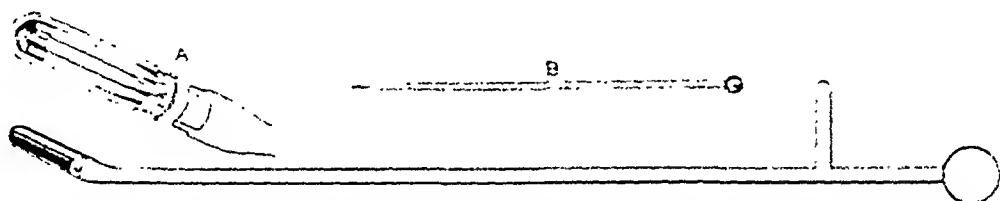


FIG. 21. New radium applicator with enlarged cap (A), made to contain four needles containing 12.5 mgms. of radium each, which may be used also for needling through the perineum by means of attachable shaft (B).

We soon found it desirable to make applications of radium per rectum, and while the simple cystoscopic applicator with the obturator in place of the cystoscope may be employed for this purpose, we soon found it advantageous to have a smaller instrument not carrying a cystoscope (Fig. 21). Where the vesical tumor is located on the base of the bladder we usually make applications of radium to the region of the tumor through the rectum. The line of lymphatic extension is also treated. The radium treatment is usually combined with fulguration and in this way more rapid destruction of the tumor is brought about.

Since the publication of the report on this radium cystoscopic applicator, descriptions of other instruments have appeared in the journals, several of which are almost identical with our instrument No. 1. The designers, however, have not seen the importance of fixing the instrument by a clamp to the table, thus omitting

Neill presented an excellent instrument for introducing the emanation of radium in glass "seeds" into tumors of the bladder through the Kelly cystoscope, and more recently Muir has devised an ingenious radium emanation introducer which is provided with a slot which greatly facilitates the introduction of the emanation seeds.

Radium has also been applied to bladder tumors through suprapubic wounds. By this method masses of radium have been placed against the tumor, smaller amounts have been introduced in the form of needles, and seeds with emanation have been left buried in the tumor mass. It was soon found that very small doses would have to be employed to avoid deep necrosis and painful ulcerations. In one of our patients in which six glass points of emanation, each containing  $2\frac{3}{4}$  mc. of radium, were buried in a sessile carcinoma of the vesical neck, an extremely painful ulcer was produced and suprapubic excision was required in

order to relieve the patient of the intolerable pain. We now never use unscreened points of greater strength than 1 milligram or 1 millicurie, and glass seeds of  $\frac{1}{2}$  millicurie are probably preferable. They should be inserted so that they completely occupy the tumor, in dosage sufficient to allow 1 milligram for every cubic centimeter of tissue.

Where a suprapubic operation is done, we usually remove the tumor mass as completely as possible, either with the electrocautery or by means of diathermy, and then insert the radium into the base, including also the normal area immediately surrounding the tumor.

In a recent study of our results made by Scott and McKay of the Brady Urological Institute staff, 534 cases were analyzed. In papillomas, where the bladder wall was not infiltrated, excellent results have been obtained both in malignant and benign cases, by a combination of radium and fulguration; almost all have been cured. Where infiltration was present, the results have been far less satisfactory, but a few strikingly good results have been obtained by these methods and in others where cure has not been obtained, great symptomatic relief for a long period has not infrequently been obtained. In 28 cases in which suprapubic implantations of radium have been made, there are apparently 4 cases in which the tumor has been completely destroyed or had not recurred, according to the last report. In 23 cases in which deep roentgen-ray therapy combined with some other form of therapy has been employed, there are 6 in which the tumor has not recurred, according to the last report. Among these are several in which really remarkable disappearance of extensive carcinoma of the anterior wall of the bladder is recorded.

It is needless to say that in the case of infiltrating carcinoma, radical resection should be carried out wherever possible; and in the treatment of those tumors situated in the vertex of the bladder, or in portions of the anterior or lateral walls

which can be satisfactorily reached, excellent results have been obtained by resection, far better than those obtained by any other method of treatment. By these various methods of therapy the results now obtained in benign and malignant tumors of the bladder are infinitely more satisfactory than they were when surgical excision was the only method employed, for then not only the benign but the malignant tumors almost invariably recurred. In benign papillomas, by means of fulguration, diathermy, radium applications and roentgen ray, practically every case can be ultimately cured. It is true that benign recurrences in all parts of the bladder frequently occur and require intermittent treatment. In malignant cases, where the disease is papillomatous, a fairly large proportion of cures can be obtained without operation, by means of radium and roentgen ray plus fulguration.

*Prostate.* Cancer of the prostate can easily be reached through the urethra, rectum, perineum or bladder. The first cases treated through the urethra were those of Pasteau and Degrais with the radium carried in through a Coudé gum catheter, as above described. Since 1914 we have treated some 500 cases with our metal radium applicator, at first with and afterwards without the cystoscope-carrying sheath. The method employed has been similar to the one used in the treatment of bladder tumors with our cystoscopic radium applicator. The radium is placed in the desired spot under the direction of a gloved finger in the rectum and then held there by a clamp to the table. The instrument which we now use carries two small platinum tubes which contain 100 milligrams of radium element within a hollow beak composed of silver surrounded by gutta-percha. The alpha, beta and secondary rays are thus almost entirely eliminated and by placing the radium in a fresh spot each time and never applying it again in the same area, we have found it possible to give as much as 2000 milligram hours by rectum, without

producing ulceration. Not infrequently, irritation, edema, rectal pain and spasm occur as a result of treatment, but by careful dissemination of the radium over the

radium can be thus applied just as freely and satisfactorily without the cystoscope as it can with the cystoscope in bladder tumors. Being fixed in the proper posi-

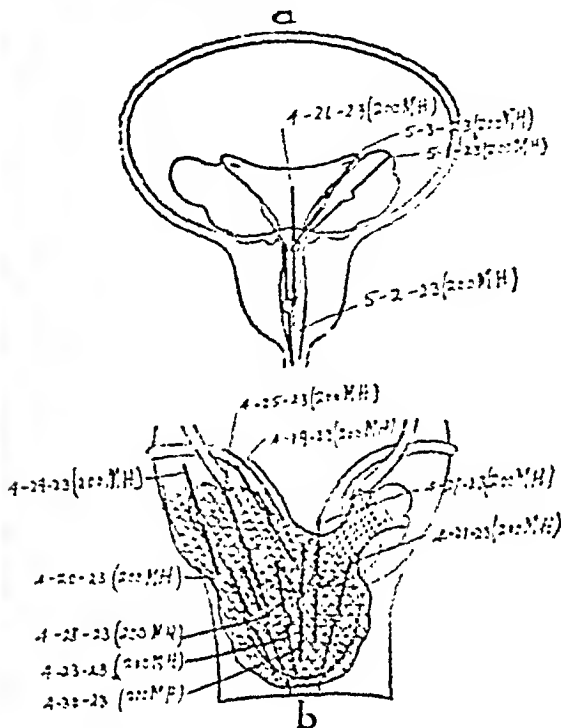


FIG. 22. I. W., B.U.I. 11338, male, aged sixty-nine years. Admitted April 10, 1923. Two years before admission developed frequency and urgency. One year before admission developed "rheumatism" of lumbar spine and both hips. Examination: prostate enlarged, very hard, nodular. Left seminal vesicle involved. Wassermann reaction negative. Roentgenogram 4311 showed very extensive metastases to lateral bones of pelvis, and to spine; sacrum relatively free, and atrophic. Many phleboliths in pelvis. Radium therapy given June 5, 1923. had had 800 mg.-hr. in rectum, 400 mg.-hr. in urethra, 400 mg.-hr. in bladder (trigone). Treatment almost every day. June 30: just concluded first course of twelve deep roentgen-ray treatments of 33 minutes each in four days. July 9, 1923, considerably improved; urinary intervals three hours during night, five hours during day; no hematuria; rectal irritation improved; no pain in sacral and lumbar regions. August 18, 1923, no increase of urinary disturbances; great pain in back and genital region. September, 1923, pain in back persisted, but relieved by daily doses of codeine.

prostate and seminal vesicles, as shown in Figures 22-24, ulcerations are positively avoided. Cases are also treated with the same instrument introduced through the urethra, at first near the apex, and then more deeply so as to include the intravesical portion of the enlarged middle lobe. By passing the instrument into the bladder it may be turned downward so as to lie against the trigone and thus afford radium treatment to the region involved above the prostate, around the seminal vesicles and between them. By careful manipulation and attention to technical detail the

tion, the radium is directed against the desired point without the production of a burn in the rectum, where such precautions were not taken. In many cases remarkable disappearance of very extensive involvement and enlargement of prostate and seminal vesicles is brought about. Where possible we carry out our radical operation—resection of prostate, vesicles and trigone.

Unfortunately, in many of these cases metastases have already occurred, as shown in Figures 25 and 26, or the disease has progressed so far that a radical cure

is out of the question. In such unfavorable cases we use radium, as above outlined, and the clinical improvement is often amazing in that hematuria, pain and

void with comparative freedom. In some cases this result has lasted for several years; in fact, until the death of the patient. In many of these cases we have

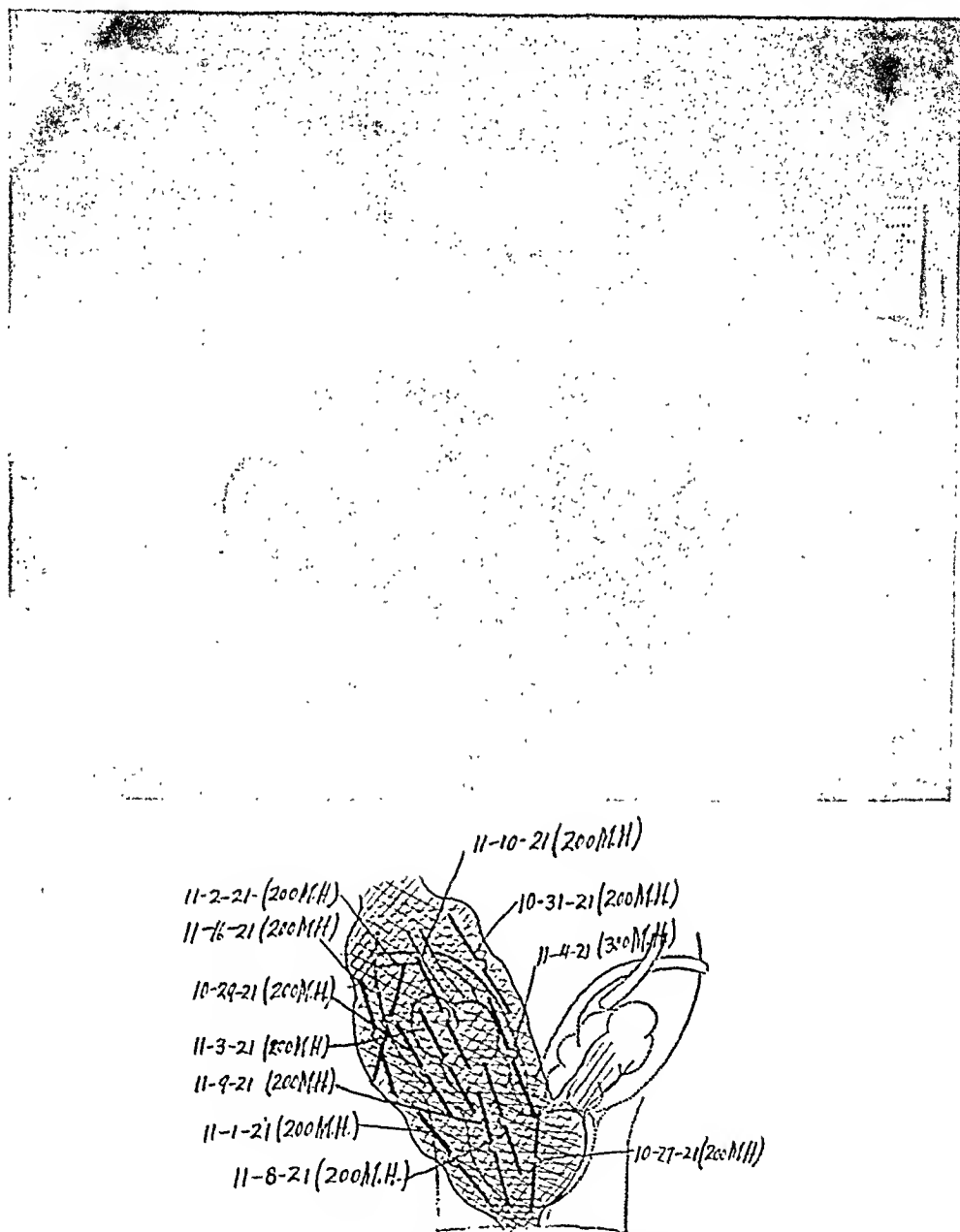


FIG. 23. I. N. K., B.U.I. 10055, male, aged fifty-nine years. Admitted October 27, 1921. Frequency and difficulty of urination for sixteen months, suffering from great pain in hip and groins. No hematuria. Rectal examination: very extensive carcinoma of prostate and left seminal vesicle. Frequency, night, four times and day, seven times. Catheterization: residual urine 100 c.c. Roentgenogram 3340 showed extensive metastases, osteoplastic type, in fifth lumbar sacrum and iliac bones. Treated by radium; considerable improvement in pain and frequency.

difficulty of urination generally disappear very considerably, if not completely. Many patients who were leading catheter lives have been able to give up the catheter and

found deep roentgen-ray therapy of the greatest assistance. The plan usually followed is for the patient to receive, on alternate days, treatment with radium

applications by rectum, urethra and then by bladder, and on the other days deep roentgen-ray therapy, from fifteen to twenty treatments of twenty-five minutes' duration being usually employed in the first series of deep roentgen-ray therapy. The number of radium treatments varies with the case, the extent of the involve-

firmly in the proper place by a clamp, and fastened to the table. Elsewhere, we have given detailed cases in which this form of therapy has been the method used, with charts showing the application of radium along with roentgen-ray therapy, from which our customary practice can be gleaned.

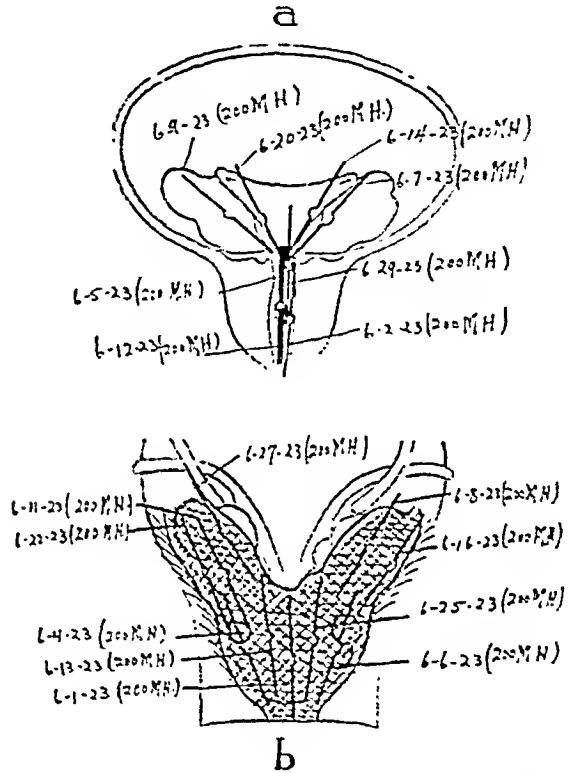


FIG. 24. W. R. M., B.U.I. 11467, male, aged sixty-three years. Admitted May 31, 1923. Difficulty of urination for four years; hematuria recently. Great swelling of right leg. Prostate and vesicles enlarged, very hard, nodular and adherent. Roentgenogram 4469 showed localized destruction with new-bone formation of sacrum; other pelvic bones and spine free. Radium treatments, each with 200 mg.-hr., by rectum urethra and trigone. July 3: during past five weeks patient had had 2000 mg.-hr. by rectum, 800 mg.-hr. by urethra, 800 mg.-hr. by bladder. Also received four deep roentgen-ray treatments, all of which were given through the front. Incontinence of urine had disappeared; voided at intervals without catheter. Prostate normal in size, shape and consistence. October 30, 1923, patient much better, rectal irritation gone, swelling of leg improved, some pain in right hip. Prostate and seminal vesicles no longer suggestive of cancer.

ment, and the reaction; but as a rule we are able to give from 1400 to 2000 milligram hours by rectum, 400 to 600 milligram hours by urethra and from 400 to 800 milligram hours through the trigone, with the simple radium applicator carrying 200 milligrams (tandem) in its beak. Each treatment, as above described, is of one hour's duration, the patient being fixed upon the table, the radium being held

In 1916 Barringer, following the work of Duoaine, brought out the use of radium needles which he inserted into the prostate through the skin of the perineum with the assistance of a finger in the rectum. His needles contained from 10 to 25 milligrams of element and are allowed to stay in place for eight hours or more. In many of our cases these needles have been employed in addition to the local application through

rectum, urethra and trigone, as already described. In some cases the needles seem to be of distinct assistance, while in others the results are distinctly bad. It is now our practice to use them in only a small proportion of the cases. We have also introduced radium emanation through an open urethroscope into the substance

operative attack upon the prostatic obstruction. If the patient is able to void rather freely, our method is to expose the prostate by means of our long urethral tractor and, after incision into the prostate and urethra, to insert platinum needles containing 1 milligram each of radium through the prostate and adjacent portions



FIG. 25. E. W. M., B.U.I. 13767, male, aged sixty-nine years. Admitted July 29, 1925. Frequency and difficulty of urination for two years. Recently had had pain in back and sacral region, radiating down into legs. Urination every hour. Poorly nourished man. No enlarged glands. Rectal examination: markedly enlarged, nodular, irregular and very hard prostate, both seminal vesicles involved. Roentgenogram 6193 showed areas of osteoplastic bone metastases of second, third and fourth lumbar vertebrae, sacrum and right ilium. Treatment: radium. Condition improved.

of the prostate on each side and posteriorly; glass tubes containing 1 milligram each were employed. In this way less local necrosis and more widespread contact are possible, but here again our experience seems to indicate that the local applications with the larger amounts are preferable. Radium may also be applied through an open perineal wound with or without



FIG. 26. W. S. A., B.U.I. 13625, male, aged seventy-seven years. Admitted June 18, 1925. Frequency of urination for nine months, occasional catheterization necessary; frequency at time of admission, every half hour. Pain in penis; none elsewhere. Feeble old man; glands negative. Rectal examination: prostate enlarged, nodular, very hard and adherent, both seminal vesicles involved. Urine bloody. Roentgenogram 6108 showed two areas of metastases in right ilium, three or four in left ilium, one in sacrum, and ischium. Suspicion of metastases of lumbar vertebrae. Hypertrophic arthritis of second lumbar vertebra. Radium treatment. Improved.

of the seminal vesicles and other surrounding tissues. We try to have 1 milligram in each cubic centimeter of tissue. The number of cases in which this has been employed is too small to give deductions of value as to the efficacy of the treatment. Radium has also been introduced through open suprapubic wounds, into the prostatic urethra and adjacent portions of the prostate and seminal vesicles, through the bladder mucosa. For these types we employ

needles of 1 milligram each, to which are attached threads for their removal.

At the same time we usually introduce two needles containing  $12\frac{1}{2}$  milligrams of radium more deeply into the lateral lobes of the prostate and two tubes containing 10 milligrams each rather deeply into the apex of the prostate and adjacent mem-

have been remarkably satisfactory. As a rule we have employed our method of local application, as first described.

Where obstruction to urination is complete and unrelieved by radium treatment, we usually either carry out our conservative perineal prostatectomy or our punch operation to restore voluntary urination.

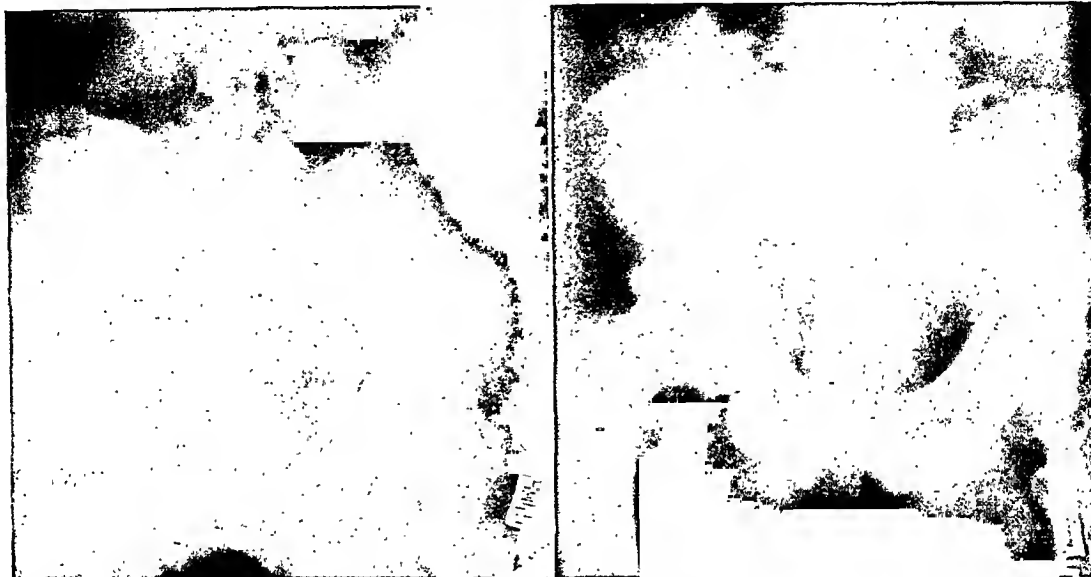


FIG. 27. E. B., B.U.I. 13403, male, aged eighty-one years. Admitted April 14, 1925. Frequency and difficulty of urination for seven years; dysuria. Nocturia ten times, diuria eight times. Sciatica, right side; walked with slight limp. Examination: head normal, chest flaring, bones negative. Rectal: prostate enlarged, right lobe indurated, but not stony hard or of third degree. Vesicles negative. Induration hardly sufficient to suggest carcinoma, but sciatica suspicious. Roentgenogram 5945 showed marked osteoplastic type of bony change in pelvis suggesting carcinoma metastases. In view of roentgenological findings, diagnosis of carcinoma made. Radium treatment given. Being dissatisfied with diagnosis, second roentgenogram, 5969, taken; this included right upper femur. Paget's disease diagnosed. Comment: In reviewing roentgenogram 5945, the bone picture certainly suggests cancer, but the deformity in the right side of the pelvis and changes in the head and shaft of the femur shown in roentgenogram 5969 make the diagnosis of Paget's disease unmistakable.

branous urethra. In some cases we have also employed here two tubes of 100 milligrams each in the urethra by means of a rubber catheter. In such cases the latter tubes are allowed to remain in place only about five or six hours, the needles of  $12\frac{1}{2}$  milligrams are removed in about eight hours, the tubes of 10 milligrams in about ten to twelve hours, and the twenty 1 milligram needles in about thirty-six to forty-eight hours. Treated in this way, the patients receive 2500 to 3000 milligram hours, generally with little or no necrosis. Some of the results obtained by the intravesical method of introducing radium

Both of these procedures are remarkably satisfactory. In a report of 100 cases which were studied in this clinic by Deming, surprisingly good results of long duration, with complete removal of obstruction as long as the patient lived, were recorded.

The radical operation is the ideal method where the diagnosis can be made sufficiently early. Our technique comprises the radical excision of the prostate with its capsule, urethra, adjacent part of the bladder, seminal vesicles and vasa deferentia. By means of the technique which we have described elsewhere, radical cures have been obtained in about 60 per cent of



the cases, where the cases have been followed over a period of five years. If practitioners could be aroused to the importance of rectal examinations, and be led to suspect marked induration even if the prostate produces little or no obstruction, many more cases suitable for radical cure would come to hand.

In conclusion, it may be said that the treatment of carcinoma of the prostate has become much more satisfactory in recent years, that it is possible to cure radically a certain portion of the cases which are seen sufficiently early, that in others by the use of radium and deep roentgen-ray therapy a remarkable amelioration of symptoms can be obtained, and in rare instances apparently complete cures are thus effected. Radium and roentgen ray have, therefore, contributed very splendidly to the progress of therapeutics in this field.

Sarcoma is much more rare than carcinoma of the prostate; in fact, we have seen only 7 cases of sarcoma in this clinic, whereas there have been 700 cases of carcinoma. Sarcoma usually comes on insidiously and when first noted is in the form of a large globular, retrovesical mass which obscures the seminal vesicles and prostate and pushes the bladder forward. In some cases the prostate is of itself only slightly involved. The disease arises in the tissues in and about the prostatovesicular junction. These tumors usually reach great size without invading or ulcerating the urethra, bladder or rectum. They are usually elastic but sometimes are quite soft and occasionally are hard and nodular. In one recent case the ureters were obstructed, with complete anuria. Radium and roentgen-ray therapy is remarkably effective in these cases. We have now had 3 cases in which there has been extraordinary disappearance of very large tumors, followed now for several years with apparent complete cure. In one case we found it necessary to carry out suprapubic cystotomy with insertion of ureter catheters to relieve the obstructed ureters. Through

the suprapubic wound we inserted radium points and large masses of radium and have subsequently given applications through the rectum and urethra, with now almost complete disappearance of the tumor which was about five inches in diameter. Deep roentgen-ray therapy is a most valuable adjunct to the use of radium in these cases



FIG. 28. W. P. M., B.U.I. 12631, male, aged seventy-eight years. Admitted August 22, 1924. Frequency and difficulty of urination for ten years, complete retention for three days, pain on urination, no note of pain elsewhere. No difficulty of locomotion. Examination: prostate moderately enlarged, smooth and elastic, seminal vesicles negative. Cystoscopy: R.U. 50 c.e., B.C. 100 c.e. Small, rounded median lobe. Urine acid, 1.015, alb. trace, W.B.C. +, coeci +. Diagnosis: benign prostatic hypertrophy. Roentgenogram 5404 showed extensive osteoplastic deformities of spine and pelvic bones. Marked deformity of pelvis. Changes in bones similar to those caused by carcinoma metastases, except that marked deformity seen here is typical of Paget's disease and is not seen in carcinoma.

and furnishes one of the most brilliant fields for the use of this therapy in urology.

*Urethra.* Carcinoma of the bulbous urethra is rare and unfortunately very little amenable to either surgical or roentgen-ray and radium therapy. We have seen very few cases and all too far advanced for any benefit.

Carcinoma of the pendulous urethra usually also involves the penis, so that the surgical problem consists of radical amputation and removal of the glans in one

tion, nor does it warrant the transplantation of the urethra to the perineum. Remarkably good results have been obtained by a procedure in which the

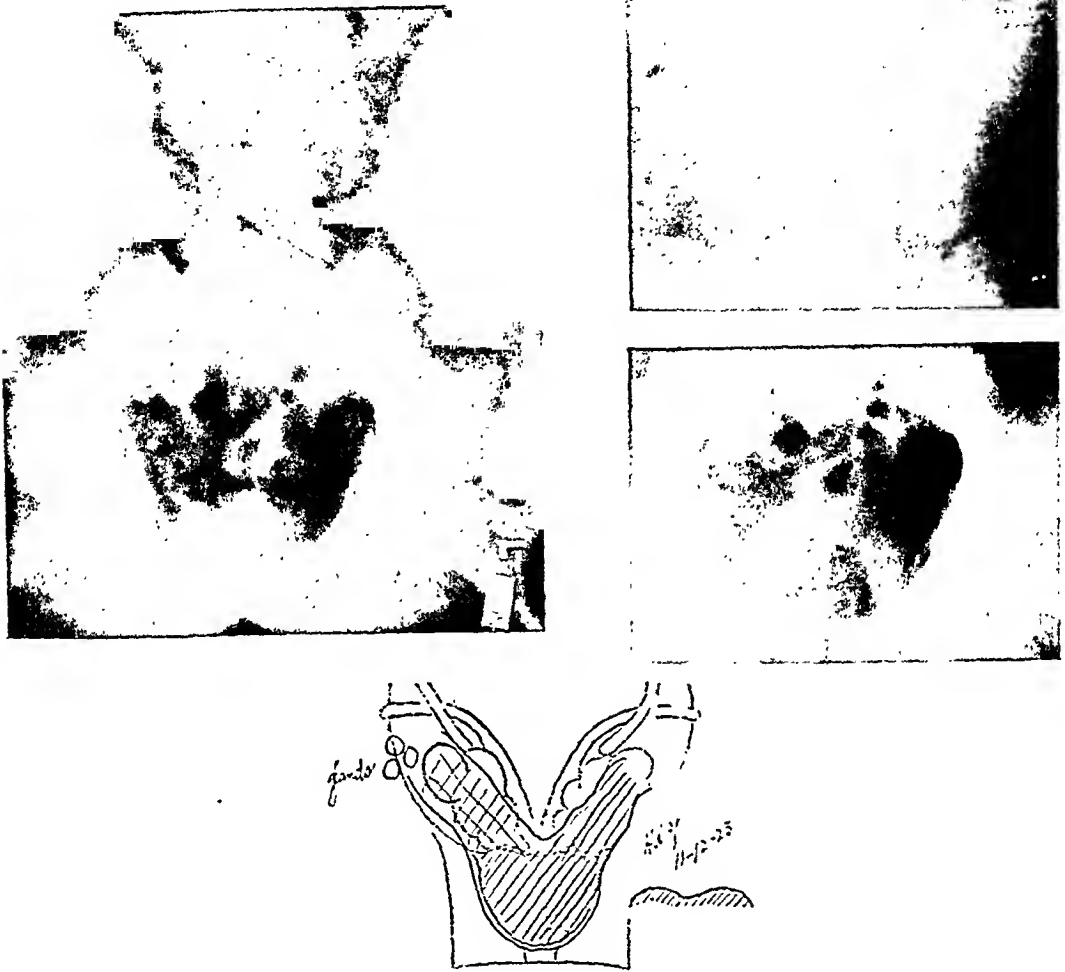


FIG. 29. A. H., B.U.I. 11901, male, aged fifty-three years. Admitted November 10, 1923, complaining of pus in urine, of six years' duration; nycturia twice. Pain in back. Rectal examination: prostate slightly enlarged, slightly adherent and slightly indurated. Seminal vesicles negative. Three enlarged glands on left side, as shown in chart. Cystoscopy: R.U. 45 c.c., B.C. 375 c.c., slight hypertrophy of lateral and median lobes. Urinalysis: acid, 1.015, alb. o, w.B.C. o, R.B.C. o, bacteria o. Roentgenogram 4765: pelvis and spine presented widespread areas of bone destruction and bone formation, typical of metastasis of prostatic carcinoma. Although urological examination did not suggest cancer, in view of roentgenological findings and pain in back, patient given deep roentgen-ray therapy, 132 min. over front and back with 1 mm. Cu + 1 mm. Al filter, 200 kv. with 4 ma. and 77 min. over sides; size of field 20 by 20 cm. over front and back, 15 by 15 cm. over sides. No treatment for prostate. February 26, 1924, patient had no symptoms whatever, pain gone. June 30, 1925, letter: condition continued improved; roentgenogram showed diminution of process in bones of pelvis. Comment: In view of the improvement of the patient after twenty months, in the absence of prostatic findings, a diagnosis of metastasis of prostatic cancer was doubtful. Paget's disease was considered, but ruled out by the absence of bone lesions elsewhere. Lues was next considered, but the Wassermann reaction was negative. A positive diagnosis was, therefore, uncertain. We have at least 12 cases similar to this.

piece with the lymph glands leading from the original growth to the groins. Our experience does not justify total emascu-

urethra is brought out in front of the scrotum. Radium and roentgen-ray therapy have been strangely ineffective in carci-

noma of the penis. One would expect excellent results in a region which is so easily attacked by this method of treatment, but it is generally conceded that little benefit has been obtained. Barringer has recently brought forth slight hope by the recital of a few cases, but the results obtained are still so unsatisfactory that a radical amputation of the penis, with removal of the lymph glands of the groin, should always be carried out, if possible.

*Testicle.* Treatment of tumors of the testicle by radium and roentgen ray has also been remarkably unsatisfactory. Undoubtedly surgical removal should always be carried out. Involvement of the retroperitoneal glands seems to be most beneficially handled by deep roentgen rays. While we still believe that radical removal of retroperitoneal glands should be carried out in all favorable cases, postoperative deep roentgen-ray therapy should not be omitted. Three of our cases, which have now been followed for several years, seem to show that this plan may give excellent results.

#### CONCLUSIONS

In the above recital we have shown that there is no field in medicine in which radium and roentgen-ray therapy gives more satisfactory results than in urology.

Nowhere can radium be applied to deep-seated organs as accurately as by the cystoscopic and urethral and rectal applicators. Radium is valuable not only in malignant but also in benign conditions. The roentgen ray is also of greatest assistance employed in conjunction with and subsequent to the use of radium. By such combined methods of attack not only are many cures obtained, but even in unfavorable cases great betterment of symptoms usually follows. In the relief of pain produced by metastasis to the spine and along the pelvic nerves the treatment with deep roentgen-ray therapy as above outlined gives really amazing results.

Our experience would seem to warrant the following conclusions: The best treatment for superficial papillary carcinoma, whether localized or extensive, is a combination of deep roentgen-ray therapy with radium applied directly to the surface of the growth. Radium alone has been very successful in handling this type of case, but frequently so much radiation is required that the destruction of the tumor is followed by a severe radium ulceration. In our experience, the results obtained by the combination of deep roentgen radiation with radium are better when the tumor has received 600 to 800 milligram hours of radium before the roentgen-ray treatment is started.



# DIATHERMY IN VENEREOLOGY\*

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**D**IATHERMY is the use of an alternating electric current of high voltage and high frequency for the production of heat within the tissues of the body. In 1880 d'Arsonval discovered that a current reversed over five thousand times a second caused no muscular contractions nor sensations other than heat in the body. Bordier, Wertheim, Salomonson, Zimmerman and Nagelschmidt in Europe and DeKraft, Snow, Clark, Granger, Price, Sampson, Titus, Stewart and others in this country have developed the technique to its present high efficiency.

Previous to this method of treatment our only attempt at developing internal heat was from without, in an effort to drive it through the skin into the tissues. The old remedies were heated wet dressings, electric pads, hot water bags, hot packs and sitz baths. For years radiation from electric light bulbs has been used with success for heat production beneath the skin.

It is a well-known fact that increased heat within living tissues results in active hyperemia. August Bier was the first to show that passive hyperemia has distinct analgesic, bactericidal, absorptive, solvent and nutritive effects. The natural method of causing hyperemia is inflammation with fever. Diathermy produces a localized hyperemia in any selected region.

Diathermy may be both surgical and medical in its use. Surgical diathermy with the d'Arsonval current is electrocoagulation, a heating process in the vicinity of the active electrode. Fulguration is the application of sparks from the active electrode, using the Oudin monopolar current. Electrodesiccation is drying-up of tissue by insertion of a needle electrode, using the Oudin current. When we use the d'Arsonval current, a large electrode is placed

beneath the sacrum and a very small electrode, varying in size from a needle point to a dime, is placed on the part to be destroyed. The current is so concentrated by the small electrode that it generates heat enough in the tissues to coagulate or cook them.

The following conditions in venereology are treated by means of medical and surgical diathermy: acute urethritis, acute epididymitis and funiculitis, prostatic abscess, acute and chronic prostatitis, stricture, folliculitis, chancroidal ulcers, verruca; and, in the female, acute and chronic endocervicitis, chronic salpingitis, adnexal disease and infections of Skene's and Bartholin's glands.

During the past five years we have been treating gonococcal urethritis with very warm irrigations of 1 to 4000 acriflavine in normal saline solution. In our paper upon this subject four years ago we emphasized the fact that the value of a solution depended greatly upon the temperature. A case cleared up much faster if the solution was over 102°F.

Most of us have been impressed with the rapid cure of gonorrhea following a severe epididymitis or prostatic abscess where the body temperature has risen above 102°F. for a number of hours. We have often seen the gonococci disappear from the urethra during an intercurrent disease such as pneumonia, influenza or typhoid.

Laquer injected emulsions of living gonococci into the joints of dogs; he found that the joints treated with diathermy contained sterile fluid whereas joints not treated with diathermy contained gonococci. Santos experimented upon dogs in order to determine the effects of different degrees of heat. He inserted the electrode into the urethra of a dog and heated the

\* Read with motion picture demonstration of technique before the Harlem Medical Association, New York, December 1, 1926.

instrument to 113°F. for one hour. No distress was apparent. The dog was sacrificed after eight days, and the urethra showed no abnormality. Microscopically there was only an epithelial desquamation. He has experimented upon himself and states that the point of intolerance is 114.8°F. He has kept the urethra heated to 113°F. for one hour without the slightest tissue destruction.

It is a well-established fact that at a temperature of 113°F. the gonococcus is instantly destroyed; 108°F. will destroy it in from thirty to forty minutes, while 104°F. requires six to eight hours. Since the normal epithelial cell can survive a temperature of 118°F. for one hour or more, and connective tissue cells 122°F., the rationale of this treatment is evident.

Corbus and O'Connor report excellent results in acute gonorrhea in the male using the urethral thermophore as the active electrode in the urethra and the autocondensation couch as the inactive electrode. We have always objected to inserting any instrument into the urethra while a discharge is present. In the first few cases treated we used the penis clamp. We found that by giving 110°F. for thirty or forty minutes a thick purulent discharge filled with gonococci was changed after twenty-four hours to a mucous discharge in which leucocytes and some epithelial cells but no gonococci were present. It is advisable to give a few more exposures to make certain that we have not missed any organisms. Diathermy alone will not cure all cases of urethritis, even though the patient be free from gonococci. The secondary lesions, such as infiltrations, folliculitis, prostatic involvement, etc., must be given appropriate treatment. The temperature in the urethra is determined by a rectal thermometer inserted during the treatment.

In the treatment of folliculitis we have had marked success by electrocoagulation of the follicles. The patient retains about 8 c.c. of 2 per cent novocaine in the urethra for ten minutes. The McCarthy or Young endoscope is then passed and when

the follicle is visualized an electrode of special design is passed and buried in the follicle. The current is then gradually turned on by means of either a foot switch or a handle. About 1000 ma., using the bipolar method, has proved most satisfactory.

The severe pain of acute epididymitis and funiculitis is always relieved after the first application of diathermy. Occasionally a second or third treatment is necessary to cause an abatement of the pain. We use either the Corbus clamp or molded tinfoil over the scrotum and internal abdominal ring. There seems to be, if any, much less enlargement of the poles remaining than after any other form of therapy and we are of the opinion that there will be fewer cases of sterility if epididymitis is treated with diathermy. The degree of heat used is not sufficient to destroy the tubules. We must bear in mind that there is no method at present to determine the degree of heat in the scrotum. The current is increased to the extent of cutaneous discomfort and then is slightly reduced so that no unpleasant sensation accompanies the treatment. We find about 700 ma. for from thirty to fifty minutes sufficient for a treatment. The older method of treatment by rest in bed, elevation and strapping of the testicle, sodium iodide intravenously, vaccine, etc., causes great loss of time, and the operation of epididymotomy involves hospitalization for about one week. With diathermy it is a common occurrence for patients to come to the office suffering excruciating pain and leave within an hour greatly relieved. An interesting case was that of a patient suffering from bilateral epididymitis who, three months after treatment, had motile spermatozoa in his semen.

Prostatic abscess, acute and chronic prostatitis and seminal vesiculitis have always been treated by hot sitz baths and hot rectal irrigations. No other method has been so successful in decreasing the inflammation as diathermy and we have found it to be the most satisfactory agent

in the treatment of these conditions. Recently we have found it most efficacious in the abortive treatment of acute prostatic abscess. It relieves pain, decreases the prostatic mass and aids in complete resolution. The patient is placed in the dorsal position, the rectal electrode is lubricated and slowly introduced so that the exposed metal surface is in direct contact with the point of greatest tenderness. The indifferent electrode is coated with soap and water and placed over the suprapubic region. The current is increased slowly until the point of intolerance is reached and is then turned down slightly. This point of intolerance usually varies between 500 ma. and 1700 ma. Duration of a treatment should be at least forty-five minutes, preferably one hour. We find that the vesicles in seminal vesiculitis are much easier to strip after diathermy. Relief from backache and "rheumatic" pains due to chronic prostatitis and vesicular disease is obtained after diathermy and massage.

Chancroidal ulcers and verruca in both male and female are best treated by electrocoagulation. A few minims of 1 per cent novocaine are injected a few minutes prior to destruction with a needle electrode.

When chronic endocervicitis is treated by local applications and douches, very little, if any, effect is made on the gonococci that remain in the endocervical glandular tissue. Using diathermy, a temperature of 116°F. can be maintained within the cervix for a period of forty minutes without causing pain or destruction of tissue. Corbus and O'Connor report excellent results with this method of treatment. They insert a thermophore as the active electrode in the cervix. We reserve this method for the true chronic endocervicitis cases and never use it if there exists the slightest tenderness in the adnexa or if

a profuse vaginal discharge is present. For the treatment of acute gonorrhea in the female we use the Chapman vaginal electrode as the active electrode and the indifferent electrode is placed over the suprapubic region. A treatment is given every three or four days, about 1000 ma. being applied for about forty-five minutes. The patient is also advised as to other routine treatment, such as douches, etc. Cultures and smears are taken each month after menstruation and a case is not discharged as cured until six such findings are consecutively negative. To date we have been able to follow up only 10 cases managed in such a manner and they are still free from gonococci; 4 of them have been under observation two years.

Chronic salpingitis gives excellent results when treated by diathermy alone. We use either the rectal or Chapman electrode as the active electrode and the indifferent electrode is placed over the suprapubic region. Treatments are given every four or five days, about 1000 ma. being given for about forty-five minutes. Increased vascularity and free drainage undoubtedly account for the results obtained. When surgical intervention is necessary the operative procedure for chronic adnexal disease is simplified after the patient has had a few diathermy exposures.

In a few selected cases we have treated the female urethra by means of the urethral thermophore. A temperature of 113°F. can be induced for one hour without pain or subsequent tissue destruction.

Skene's and Bartholin's glands are frequently treated by electrocoagulation. Injection of a few minims of 1 per cent novocaine renders the procedure painless. Abscess of the glands must be treated surgically.

Diathermy has thus an important place in modern venereology.



# PARAFFINOMAS

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**P**ARAFFINOMA is a term signifying the tumefaction resulting a long time after paraffin has been injected under the skin for cosmetic purposes. For possibly a number of years the paraffin remains fairly soft and pliable in the tissues and is really innocuous, but then lumps gradually become appreciable to the touch and often become visible. These hard masses are produced by connective tissue growing about the paraffin and by strands growing into it from the encircling connective tissue. Thus the paraffin is enmeshed in minute compartments, which makes it quite impossible to spoon it out *en masse*. It must simply be cut out as a whole. This connective tissue production is caused by the very mild irritation of the foreign body paraffin.

Often the skin over the paraffin will break down and the paraffin will be gradually extruded in particles, as the walls of the minute compartments also break down, liberating the contained paraffin. Within the last two months I have removed three such tumors, twelve years and ten years after the injections, performed by makers of a much advertised facial soap. One was from the neck of one patient and the other two were from each cheek of a second.

These hard lumps under the skin are sensitive only when they become inflamed, as may occur in the process of slow expulsion. The skin only later becomes involved, and bluish with telangiectatic vessels on the surface over the tumor. Persons with these deformities are seeking the surgeon more and more frequently as time passes.

During and before the War, a favorite method of elevating the bridge of the nose

was to inject paraffin. Instances have been recorded of blindness in one eye from embolism following the injection. Eventually all of this nasal paraffin will have to be removed though this is not a disfiguring performance in the nose since it can be accomplished through incisions within the nares.

In other conspicuous regions, such as the cheeks (the paraffin having been injected to fill out depressions), removal of these paraffin masses can be accomplished only through incisions that always leave scars. One of the most hideous deformities that I have ever seen was in a woman who had paraffin injected into the center of each cheek. It sloughed out, leaving scars, the size of dimes, depressed and tightly adherent to the underlying muscle. Excision (oval transversely) of the scars, with undermining so as to make cavities into which free fat grafts (from the thigh) were slipped to fill out the depressions, accomplished some improvement in her appearance, but the ineffaceable scars in the center of each cheek are very conspicuous and disfiguring.

During the War one of the best and most distinguished French surgeons injected paraffin into noses. One must believe, with all our added experience, that he is probably removing this paraffin now. Under no circumstance whatsoever should paraffin ever be injected into any tissue of the body as it always eventually acts as a foreign body.

When operating to remove these masses, one must entirely encircle the tumor and remove it completely in a mass with sharp dissection. If conspicuous depressions are caused by the removal of the paraffin, these can be filled out by free fat or folded fascia grafts.



# DIVERTICULITIS OF THE COLON\*

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DETROIT, MICHIGAN

THE word diverticulum has been used for two conditions, both of them consisting grossly in formation of a pouch or pocket in the wall of an intestine or other hollow organ (bladder, esophagus, bronchus, etc.). In one of these conditions the whole wall of the viscus takes part in the formation of the pouch; in the second, it is formed by only the mucosa herniating through a weak spot in the muscular coat of the bowel or bladder. The first group is usually a congenital condition and is also called true diverticulum; the second, an acquired one, is sometimes called false diverticulum. The foremost representative of the first group is Meckel's diverticulum, a remnant of the omphalomesenteric duct. The most important type of the second group is the diverticulum of the colon and especially of the sigmoid. Diverticula occur in the esophagus, stomach, duodenum, small and large bowel, gall ducts and, frequently, the bladder. Wherever they occur, food, fecal matter or urine will stagnate in them, thus giving rise to inflammatory processes (diverticulitis). On account of stagnation of urine in vesical diverticula, stone formation takes place. The esophageal diverticulum often causes serious interference with swallowing; the diverticulum, filled with food, compresses the esophagus proper, causing distressing symptoms until the patient succeeds in emptying the pocket by straining and vomiting. In the cervical portion, where most of these esophageal diverticula are located, surgical removal of the pouch has now often been accomplished. The esophageal type is usually acquired, the mucosa herniating in midlife. An old division into pulsion and traction diverticula is hardly practical, the latter being formed by traction on the part from

without (i.e., a group of infected lymph glands retracting the esophageal wall and causing a pouch formation), whereas the pulsion diverticula are caused by increased pressure within the esophagus itself.

Duodenal as well as gastric diverticula are rare conditions causing ulcer-like symptoms and, like the esophageal type, are diagnosed by roentgenography. If troublesome, operation is indicated.

Meckel's diverticula give rise to two kinds of symptoms: first, inflammatory as in appendicitis; second, those of intestinal obstruction. The tip of the diverticulum is at times still adherent to the umbilicus (omphalomesenteric duct), or becomes attached to the mesentery because of the inflammation, and forms a fulcrum for the intestine to slip over and become strangulated. In an acute abdominal condition in children, this possibility has to be thought of. Bladder and urethral diverticula have been studied extensively in past years.

I shall here give special consideration to the group that is most interesting, in my mind, on account of the variety of symptoms produced, symptoms which, if better known, will lead to the diagnosis of sigmoid diverticulitis much more frequently. In fact, I am sure that every surgeon has had numerous cases of diverticulitis without appreciating their true nature, the affection being diagnosed as peritonitis, colitis, acute and chronic appendicitis, perforated ulcer, cancer, intestinal-vesical fistula, pneumaturia, according to the predominating symptoms in a given case.

## OCCURRENCE OF DIVERTICULA IN THE COLON

Diverticula of the colon and sigmoid may exist without causing any symptoms.

\* Paper read before the Academy of Medicine of Toledo and Lucas County on December 3, 1926, based on clinic given at opening of University Hospital, Ann Arbor, Michigan, November 21, 1925.

Some observers have found diverticula of the colon in one-third of the cadavers of the aged. Certainly not all of these cause symptoms. The exact incidence is difficult to determine because in routine post-mortem examination the sigmoid is not given the minute attention necessary to recognize these minute intestinal herniations. Sixty per cent of diverticulitis cases occur in obese subjects and males are more frequently affected than females. By far the largest number occur in the lower portion of the sigmoid near the rectal junction, although occasionally they occur anywhere in the colon, and a few have been noted in the rectum and anal canal. The ascending colon and first half of the transverse colon seem rarely to be affected.

#### PATHOLOGY

The condition is a sacculation occurring usually between the mesentery and the epiploic appendages. This is probably due to the fact that the muscle wall most easily loses its tonus (is "played out") in the flabby, obese and senile abdomen.<sup>1</sup>

Sometimes the epiploic vessel is found at the apex of the sacculation, indicating that this has perhaps been the pathway of lessened resistance. However, at the Clinical Congress of Surgeons in Philadelphia in 1921, in Deaver's Clinic specimens were shown disproving the theory that the entrance of the blood vessels formed a weak spot in the intestinal wall, thus allowing the formation of diverticula. In my opinion, the cause of herniation of the mucosa is the replacement of the muscle by fat tissue. It is well known that fat tissue contributes greatly to the formation of inguinal and umbilical herniae. Everyone who has watched with anxious expectation a diverticulum of his automobile tire will appreciate why Haggard speaks of sigmoid diverticulitis as a "blowout of the sigmoid."<sup>2</sup> Constipation and the stagnation of hard fecal masses in the sigmoid may be contributory in causing this herniation.

The sigmoid diverticulum is a false

diverticulum, the mucosa herniating through a weak spot in the muscularis. The sacculi are small, they are usually filled with calcareous fecal masses, and there is a minute connection with the interior of the bowel through which the drainage is very imperfect. These facts determine most of the clinical manifestations.

1. There may be transient swelling and edema of the orifice, causing obstruction in the sac holding a fecal concretion, with perforation, leading to peritonitis or generally to a walled-off abscess.
2. There may be slow, low-grade hyperplastic inflammation (peridiverticulitis), with probable leakage of toxins and bacteria through the thin, damaged, but non-perforated wall. This may occasion a large, dense granuloma several centimeters in thickness (left iliac tumor).
3. Annular constriction of the sigmoid may develop, simulating scirrhus carcinoma. C. B. Davis, in 1921, wrote an article, "Diverticulitis of the Sigmoid Frequently Mistaken for Cancer."<sup>3</sup> We know of three cases where the sigmoid was resected for carcinoma and the microscopical examination showed only a chronic inflammatory process.
4. Adhesions may form between the peridiverticular inflammatory mass and other viscera, chiefly the bladder, leading to vesical irritability, or vesicosigmoid fistulae. Adhesions to tubes, etc., may cause the pains of pelvic inflammatory disease, salpingitis, or general matting together of pelvic viscera, clinically mimicking all varieties of pelvic infection.
5. Abscesses may burrow along the fascial planes. A low-lying sigmoidal or upper rectal diverticulitis may burrow into the ischio-rectal fossa, an intractable perianal fistula ensuing.<sup>4</sup> Some rare forms of usually fatal "idiopathic" gangrene of the scrotum have also been attributed to such burrowing infections from diverticula.

In the pathology of diverticulitis, three things are important: 1. The sac forming the diverticulum is very small and thin-walled, and the entrance is minute; therefore inflammation and perforation occur

easily. 2. The epiploic fat tabs of the colon cover over the inflamed area quickly, hence, in operating, we usually find only an inflammatory process of the sigmoid wall, covered over by an inflamed and adherent fat tab. 3. The sigmoid readily becomes adherent to other organs (small intestine, bladder, or retroperitoneal wall) and this factor is responsible for complications with symptoms in the bladder and ureters, retroperitoneal abscess formation and intestinal adhesions.

#### DIAGNOSIS

The diagnosis of sigmoiditis rests mainly upon the following points:

1. A history of colicky pains in the left lower quadrant ("left-sided appendicitis"). The attacks may be most violent, accompanied by all the symptoms of general peritonitis: pain, vomiting, tympanitis. Or they may be less formidable, causing only localized pain in the region of the sigmoid. In other cases, again, the attacks of pain recur with a feeling of fullness and gas in the left side. Clinically, "left-sided appendicitis" is quite descriptive of the usual attack of diverticulitis.

2. As in other cases of intra-abdominal inflammation, we find rigidity more or less general at first, and later a mild attack confined to the region of the sigmoid. Fever and leucocytosis vary according to the severity of the attack.

3. The sigmoidoscope has been rather disappointing in the diagnosis of diverticulitis. In very acute cases the introduction is hardly possible, and when so, does not show anything but general swelling and redness of the mucosa in the region of the diverticulitis. In chronic cases, one must remember that the entrances into diverticula are so minute that their detection through the sigmoidoscope is rarely accomplished. However, if reddening and small ulcerations are seen, diverticulitis should be thought of.

4. The roentgen ray, also, is not of much value, as one would expect. In an acute case, an opaque enema must be

given with a good deal of caution, for there is the danger of the rupture of a diverticulum. In chronic cases, diverticula may be outlined by an opaque meal or enema, and they may then retain the barium two or three days. However, diverticula may be completely filled with fecal matter and then no barium will enter.

Whenever I was able to demonstrate diverticulitis of the sigmoid, one of two conditions was found. Either barium showed the diverticulum as a round shadow outside the barium-outlined sigmoid, or oftener, after all the barium had escaped from the bowel, the multiple diverticula still showed as small round barium shadows. I have the impression that the former condition is rare, because the diverticula of the sigmoid are too small to be shown separate from the bowel. Therefore, it is important when looking for diverticula of the sigmoid, to take plates three or four days after the barium has generally escaped and then the small sacs will often show. (See Fig. 1.)

#### DIFFERENTIAL DIAGNOSIS

In acute perforative cases, perforations from other sources must be considered: gastric and duodenal ulcer, gangrenous appendicitis, acute cholecystitis and pancreatitis, and, in women, pelvic diseases. In the chronic forms, cancer of the sigmoid must be ruled out. With abscess formation, pus from other sources (spine, left kidney, etc.) must be thought of. Frequent complications with urinary symptoms make it possible to mistake this condition for left-sided pyelitis, stone or stricture of the ureter, cystitis. These difficult diagnostic questions will be taken up in considering the various types and main complications of diverticulitis.

We shall consider:

1. Acute and perforative forms of diverticulitis.

2. Milder recurring acute attacks (relation to trauma).

3. Localized abscess formations from diverticulitis.

4. Chronic diverticulitis (and reaction to constipation).
5. Carcinoma and diverticulitis.
6. Stricture of sigmoid from diverticulitis.
7. Urinary symptoms caused by diverticulitis. (including vesicosigmoid fistulae with pneumaturia).
8. Gangrene of the scrotum and ischio-rectal abscess, originating from diverticulitis.

Following are cases illustrating these various types:

### 1. *Acute Forms of Diverticulitis*

Clinically "left-sided appendicitis" is quite descriptive of acute diverticulitis. In an acute case there may be all the symptoms of an "acute abdomen": rigidity, leucocytosis, fever, vomiting, but the localizing symptoms are over the course of the sigmoid.

CASE 1. J. M., aged forty-eight, fleshy workingman, admitted to Harper Hospital, September 26, 1922.

For the past month he had had slight attacks of abdominal pain, and at times diarrhea and constipation. The day before entering the hospital, there was intense pain in the abdomen, tenderness and vomiting. At first the pain was general, then it became localized in the lower left abdomen. He was a very sick man, the skin cold and clammy with sweat, abdomen rigid in both lower quadrants, slight elevation of temperature, pulse 120, leucocytes 17,150 with 86 per cent polymorphonuclear.

He was immediately operated upon with a diagnosis of acute appendicitis, by my associate Dr. Allen. Right-sided incision showed the appendix only reddened like the intestines elsewhere. A large inflammatory mass was felt in the lower sigmoid, which was covered with inflamed fat tabs. No gross perforation could be seen. The fibrin-covered part of the sigmoid was walled off with iodoform gauze, and the man made a slow recovery. On October 14, 1922, the piece of inflamed bowel was resected, on account of the condition being possibly malignant. The patient made a good recovery from the resection and anastomosis. Microscopical report of the resected bowel tissue showed the process to be entirely inflammatory.

This is quite usual: a perforated diverticulum cannot be seen after the perforation has taken place; the diverticulum being small, it is entirely destroyed by the perforation. As to the thickened part of the intestine being mistaken for cancer, we have mentioned that already and will find it again in two other cases.

CASE 11. F. I., male, aged forty-three, very fleshy, a patient of Dr. E. W. Haass, referred to me September 17, 1919.

His illness began six days previously with acute abdominal pain in the appendix region, and he came home from the West with all the signs of a progressive case of appendicitis. Examination showed tenderness over the appendix; leucocytes 18,000, 76 per cent polymorphonuclear.

At operation I found the appendix not inflamed. In the middle of the ascending colon toward its lateral side, lay an inflamed fat tab, tightly adherent to the colon, covering over some dark, nearly hemorrhagic infiltrate in the colon. Drainage was established at this point, the appendix was incidentally removed and the man made a complete recovery.

This is the only one of our cases where a perforating diverticulum occurred in the ascending colon. Again we are dealing with a fleshy man. The main characteristic of the condition in this case was a minute gangrenous process in the colon wall covered over by fat tabs.

The foregoing case brings up the question of epiploic appendicitis as described by the Mayos.<sup>5</sup> In my mind it is doubtful whether these cases are really caused by twisting of an epiploic appendix. It seems more probable that a primary inflammation of a small diverticulum invites protective adhesion of the epiploic appendix. At operation we find an inflamed fat tab glued to the intestinal wall, truly protecting an inflamed diverticulum, but appearing grossly as an "epiploic appendicitis."

### 2 and 3. *Recurring Acute Attacks of Diverticulitis and Localized Abscess Formation*

Attacks of inflammation in the diverticulum may occur as in appendicitis and

quiet down again, the diverticulum emptying or being walled off by an epiploic appendix covering the weak and inflamed spot. Even with abscess formation, other attacks may follow if multiple diverticula are present. An abscess may occasionally discharge into the bowel with spontaneous disappearance of the tumor, but more frequently it forms a large pus collection walled off from the general peritoneal cavity. Because of its proximity to the bladder, there is frequently vesical irritability, tenesmus, etc., which sometimes very effectually cloud the diagnosis.

The following case illustrates this:

CASE III. H. S., male, aged thirty-eight. Appendectomy in 1909 for chronic appendicitis; uncomplicated recovery. In May, 1917, four years before admission, following a few weeks of mild stomach trouble (chiefly gas in the abdomen after eating), he was suddenly seized with severe pain in the lower left abdomen. He walked about for several days, then was put to bed. The pain became worse, he had fever and the left lower quadrant was tender. The bowels moved after strong enemas, with some relief. After eight or ten days the attack wore off. Roentgenograms then made showed nothing definite.

During the next three and one-half years he was very well, except that if he became constipated he would have distress in the lower left side of the abdomen; he felt as if an attack like the above was approaching and the left side of the abdomen became tender. This distress was always relieved by a bowel movement.

In October, 1920, he had another sharp attack. He felt distress for one day and a cathartic did not bring the usual relief. Then there was sudden, sharp pain in the lower left quadrant accompanied by chills and fever. This subsided in a week, following mineral baths and cathartics.

During April, 1921, he had another, milder seizure, lasting three or four days. During the first two days of this attack there was pain radiating to the tip of the penis, cramplike, and occurring every half hour. There was frequent desire to urinate. Although this wore off on the second day, the pain in the lower left quadrant continued as before. Examination at that time elicited a stricture in the

left ureter. A course of treatments for dilatation of this stricture was then instituted.

On June 4, 1921, he was suddenly seized with very violent pain in the left side of the abdomen. By midnight the pain was excruciating and accompanied by high fever, chills and vomiting. He entered Harper Hospital two days later.

At that time his temperature was 103° F., pulse 120, white blood cells 23,000 with 94 per cent polymorphonuclear, and he had severe pain and some tenderness in the left hypogastrium. During the next few days the temperature subsided, but the tenderness localized in the left iliac region with considerable spasm of the left rectus muscle.

By June 15th he had become slightly jaundiced, but the process had become very well localized in the left iliac region and the general condition was improved; total white blood cell and differential count were still quite high.

Operation, June 15: Inflamed omentum covered the region of the sigmoid. On separating this, pus escaped. A well-localized abscess, containing more than a quart of foul-smelling pus with gas bubbles, was evacuated. The inflamed sigmoid, with purulent appendices, lay at the bottom of this cavity, though no further details of a diverticulum could be made out. Drainage was instituted through the abdominal incision, and through a stab wound in the left lumbar region. Operative note read: "Poorly walled-off abscess beginning from a sigmoid perforation; no doubt a perforated diverticulum that had ruptured partly into the mesosigmoid and partly into the peritoneal cavity where it was walled off."

Postoperative Course. There was good recovery. The jaundice soon disappeared. There was a profuse discharge with fecal odor for two weeks, which gradually decreased. On July 10, there was only scant purulent discharge.

Following this severe attack the patient had several mild attacks lasting two and three days. After each one some pus was emptied by rectum. A roentgenogram during this time definitely showed more than a dozen small diverticula remaining filled four or five days after the barium injection. Even after physics the round diverticula still showed. To overcome this condition, I operated on this patient again April 3, 1922, with the idea of possibly resecting the affected part of the colon,

although the roentgenogram had shown that the diverticula extended from the middle of the transverse colon to the upper part of the rectum. On opening the abdomen, I found the descending colon had a very short retracted attachment so that it could not be brought into the wound. Toward the pelvis it ended in an adherent sigmoid with a thickened edematous wall (sigmoiditis). On separating the adherent sigmoid; the surrounding tissue appeared as if an abscess had recently formed. This condition continued to the upper limit of the rectum. Formation of an ileosigmoidostomy was out of the question. Therefore a colostomy in the transverse colon was made, with a view either to healing the sigmoiditis by keeping the stool away or to resecting the whole diseased section of colon later. For five months I allowed the stool to escape entirely through this complete colostomy. During this time I could see through the sigmoidoscope how the mucous membrane of the sigmoid improved in appearance. From a mucosa covered with small ulcers and patches it returned to a normal appearing mucosa. Occasionally the sigmoid was irrigated from the colostomy through the rectum and vice versa.

On September 18, 1922, the colostomy was closed and the man has been well since. He has gained 40 lbs. and has had no further attacks of abdominal distress. The colostomy, no doubt, allowed the inflamed bowel to heal and the adhesions between the fat tabs and the diverticula and adherent omentum have fortified the sigmoid wall so that the remaining diverticula no longer disturb. To be sure, a colostomy may not always be dependable in curing the lower bowel, and in an exaggerated case where great changes have taken place in the intestinal wall, a colostomy may have to be made permanent if resection of the affected part is impossible.

Another interesting case showing a type of recurring attacks of diverticulitis is the following:

CASE IV. C. H. McM., aged twenty-seven, a heavy, fleshy man, had his appendix removed in 1916, after having had two moderately severe attacks. Immediately after the operation he again had colicky pains. These pains, as well as those before the operation, were accompanied by urinary tenesmus. He was then treated at a second hospital where no diagnosis

was made, but a second operation was proposed. He was examined at great length at the diagnostic clinic of a third hospital, without getting any relief. He came to the Harper Hospital on September 25, 1922, his main complaint being abdominal tenderness and pain in urinating. There was a slight leucocytosis. No abnormal findings, chemical or microscopical, in the urine. Roentgen-ray examination of the kidneys and bladder was negative. Only the tenderness over the cecum suggested intestinal adhesions. The suffering of this man was so intense that operative interference was indicated.

On October 2, 1922, at operation I found an inflammatory stricture of the ileum 6 in. above the ileocecal junction, tightly adherent to an inflamed part of the sigmoid, which showed at this point a circular swelling suggesting cancer. The process also appeared grossly as cancer, to our pathologist, Dr. Morse. A radical operation was not feasible at the time and an enterostomy was performed above the stricture in the ileum. This caused all the symptoms to disappear and on October 14, 1922, twelve days later, I operated again with the idea of removing the cancerous part of the sigmoid. To my great surprise the "cancer" had disappeared and I could see only one of the epiploic appendages showing a subsiding inflammatory process. As seen frequently enough now, this is characteristic of diverticulitis of the sigmoid. The small coils of intestines were still adherent and, to short-circuit all the adherent intestines, I performed an ileosigmoidostomy. Unfortunately, this operation was followed by an intestinal obstruction, which was overcome by a new temporary enterostomy. Following this, the patient made an uneventful recovery and gained in weight, and all his symptoms have disappeared.

In criticizing this case it is evident that this patient had a diverticulitis and not appendicitis when he was first operated upon. Adhesions between the intestines and the inflamed diverticulum kept up the process. The case again is interesting because the patient had some vesical symptoms, and because the mass formed by the peridiverticulitis masqueraded as a cancer. This "cancer" belongs to the type we formerly did not understand, the "cancer" that disappears after a colostomy.

**Trauma and Diverticulitis.** The hard fecal mass in a diverticulum is separated from the peritoneal cavity only by the very thin sac wall. A sudden blow or other trauma may lead immediately to perforation, with inflammatory symptoms.

CASE V. H. S., aged thirty-nine, while driving his car, ran off the side of the road into the ditch, the steering-wheel striking him heavily in the side of the abdomen. Immediately after the accident there began dull,

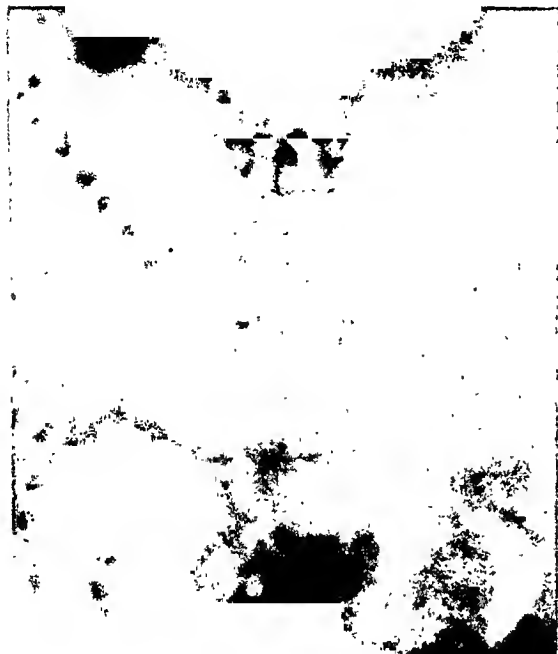


FIG. 1. CASE VI. Diverticula of the colon filled with barium, after the intestines are emptied of the mass (three to four days after ingestion of the opaque meal).

constant pain in the lower abdomen, with occasionally sharp, severe pain in the left lower quadrant. Next day there was definite left lower quadrant tenderness and rigidity, with a palpable mass. Operation revealed an acutely inflamed sigmoid covered by fresh omental adhesions. There was an elliptical inflammatory swelling in the mesosigmoid 2 in. by 3 in. in diameter, soft, glandular. The inflamed loop was brought out, the peritoneum sutured about it, and packed with gauze, completely extra-peritonealizing the process. There was stormy convalescence, with some foul-smelling discharge; then the wound healed and normal convalescence was established.

Several similar cases have been reported. Telling and Gruner<sup>6</sup> collected several cases where symptoms had followed straining at stool, lifting heavy sacks, a jolt in a motor car, jumping, etc. They conclude that "trauma has definite diagnostic value when diverticulitis is under suspicion."

#### 4. Chronic Diverticulitis

Diverticula of the colon without symptoms have been found in great numbers in autopsies; still there is no doubt that certain intestinal complaints should be referred to diverticula. Such complaints are constipation, feeling of fullness, mucus in the stools, and aching in the left side relieved by defecation. Constipation may, as some have claimed, contribute to the formation of diverticula. Straining at stool and fecal stasis obviously weaken the intestinal muscles and so allow herniation of the mucosa. But, on the other hand, diverticula also lead to constipation when the small sacs are filled and irritated, stiffening of the bowel taking place and causing a feeling of gas and tenesmus.

CASE VI. E. H., male, aged sixty-eight, for twenty years complained of "gas" and that he had to have three or four bowel movements every morning and use an enema before being relieved. Four years ago a very large prostate, causing dysuria, was removed. While the urinary symptoms were relieved, the somewhat expected relief from "gas" did not result. Three or four days after an opaque meal, roentgenography showed multiple diverticula all along the transverse colon and sigmoid. Waste-free diet and an irrigation of the colon gave this man more relief from his gas and tenesmus than any previous measures.

CASE VII. Mrs. O., aged forty-eight, complained for years of intestinal symptoms, mainly "gas" and desire to go to stool several times every morning, and some passing of mucus, but no diarrhea (stool more or less formed). Appendectomy and several pelvic operations gave no relief. At the last operation by a very prominent surgeon, diverticula of the upper and lower sigmoid were discovered in such position and extent that resection was not deemed advisable. Waste-free diet and



colon irrigation every morning also made this patient fairly comfortable.

These and similar cases should suggest looking for diverticula whenever chronic intestinal stasis is encountered with complaints of "gas" and frequent desire for stool in the morning, especially if no other intestinal lesion can be found. If diverticula are found, treatment with a waste-free diet and colonic irrigation seems to give relief in some cases. The diet, by eliminating cellulose and other indigestible waste, will prevent filling of the diverticula with masses hard to empty. The irrigations will empty the sacculi of their contents and so stop the distressing "gas" and desire to defecate. To be sure, in a case where acute inflammatory symptoms are present, irrigations should not be given.

#### 5. *The Relationship of Diverticulitis to [Cancer of the Colon]*

First: I have seen cases where the inflamed part of the sigmoid surrounding the area of diverticulitis had been taken for a cancerous neoplasm. More cases than those mentioned are known to me and many "cures" of cancer of the colon should be doubted unless microscopy has confirmed the diagnosis. The induration of the wall of the sigmoid in the neighborhood of the inflamed diverticulum gives to the palpating hand of the surgeon and to the eye the impression of cancer. In a case where surgeon and pathologist both diagnosed the surgical findings as cancer and an enterostomy was performed above the suspected neoplasm as a step preliminary to a radical procedure, two weeks later, when the abdomen was reopened for this purpose the "cancer" had disappeared. No diagnosis of cancer of the colon, if inflammation exists, should be made without a microscopical biopsy of the tissue. Otherwise, in a case of so-called cancer of the sigmoid, pronounced by the surgeon inoperable, the period of life allotted to the patient by the surgeon

may prove far too short, because he had only diverticulitis. This has happened to every busy surgeon.

Second: Diverticulitis seems to predispose to cancer. Only a thin, bottle-neck communication exists between the diverticulum and the bowel proper; through this there is insufficient drainage. Consequently, there is apt to ensue slow, attenuated, chronic inflammation, persistent irritation with continuous epithelial and connective tissue hyperplasia. This is very like the pathogenesis of other intestinal cancer (cancer following ulcer, cancer in narrow parts of the intestine, pylorus, etc.) Mayo<sup>4</sup> holds that the frequency of diverticula in the sigmoid may account for the large percentage of cancer of the colon, as compared with the rest of the bowel. Of 42 cases of diverticulitis, there were 13 in which carcinoma existed. In 1 case several diverticula were inflamed, but only one showed carcinomatous degeneration and this became adherent to the transverse colon with development of cancer therein, the lumen of the sigmoid remaining free of cancer. Handfield-Jones,<sup>7</sup> in 2 cases of ruptured sigmoid cancer, mentions 1 case of annular carcinoma of the recto-sigmoidal junction with multiple diverticula all over the colon, etc.

I am inclined to believe from several experiences that this cancer starting from a diverticulum has two characteristics: (1) The cancer often does not grow toward the lumen of the bowel, does not encroach upon the lumen, which therefore gives no filling defect in the roentgenogram (see also Mayo's case,<sup>4</sup> already mentioned, where the cancer encroached only on the secondarily invaded transverse colon and not on the sigmoid whence the diverticulum started). (2) The starting from a diverticulum will not cause partial obstruction as in most intestinal cancers, for the same reason mentioned under (1), but its early symptoms will be slow perforation and abscess formation outside of the bowel, appearing retroperitoneally in the lumbar or inguinal region. This slow abscess forma-

tion I have seen several times as the first symptoms of such cancers.

The following case illustrates the relationship of carcinoma to diverticulitis:

CASE VIII. T. N., aged thirty-two, a patient of Dr. E. W. Haass, was treated and examined several times for ureter stone. He was cystoscoped because of vesical symptoms. Then he showed an inflammatory process after these symptoms had been prominent for about a year. On October 6, 1919, Dr. Allen opened the right side, thinking he would find an appendiceal abscess; but the appendix was lying free and, while slightly inflamed, it apparently had nothing to do with a large abscess that lay retroperitoneally, and which, on opening, emptied foul-smelling pus. The patient had some relief from pain, but the abscess did not heal and at times retention caused severe pain. On February 10, 1920, I operated again and found that the abscess was limited laterally by the cecum and peritoneal wall and extended over to the sigmoid. The abscess wall gave the impression of malignant growth and extended into the wall of the sigmoid without communicating with its lumen. The tissue of the abscess wall showed adenocarcinoma. From this the man died three months later.

Here was a carcinoma of the sigmoid wall, which had never encroached enough into the lumen of the bowel to give any filling defect in the roentgen-ray film. It had developed after vesical symptoms had existed a long time and the first symptom of sigmoid involvement was a retroperitoneal abscess. The origin of such types of carcinoma from diverticula has been proved as above stated, since in such cases many other diverticula have been found in the sigmoid. The non-encroachment on the sigmoid by the carcinoma is, I believe, another proof that it originated from the mucosa in the pouch of a diverticulum outside of the intestinal lumen; and, obviously, such carcinomas starting from the thin wall of a diverticulum may easily give rise to slow abscess formation in the mesosigmoid retroperitoneally.

## 6. Stricture of Upper Rectum Caused by Diverticulitis

The obscure cases of non-malignant stricture of the upper rectum which every proctologist meets are referred by some to syphilitic and others to gonorrheal origin (Koenig). Antisyphilitic treatment usually has no influence; the Wassermann reaction is negative. To be sure, a history of lues is often present. No doubt the condition is caused by several etiological factors leading to ulceration, infiltration, and finally narrowing and stricture of the intestines, so that colostomy is necessary as the only means of symptomatic relief. Diffuse diverticulitis of the rectosigmoidal junction, with inflammatory infiltration of its wall, may be a prominent factor in producing some of these strictures.

## 7. Urinary Complications of Diverticulitis (Including Pneumaturia)

Frequent desire to urinate, and pain in the region of the left kidney are quite frequent in this affection and many cases are for this reason first referred to the genitourinary specialist. This dysuria is due first to edema in the mesosigmoid (lymphangitis from the infected diverticulum) with pressure on the ureter, followed by a hydronephrotic condition, and also to adhesions between diverticulum and bladder. As stated, transient vesical irritability is often noted in diverticulitis. In rare cases an abscess may lead towards and into the bladder or an abscess may perforate the diverticulum and then the bladder. Then is produced the condition of pneumaturia; pus and gas escape from the urethra. These sigmoidovesical fistulae are usually painless. Passage of flatus and feces by urethra, associated with a hard mass in the iliac region, is generally not due to cancer, as might be supposed, but to diverticulitis. Moynihan<sup>8</sup> first emphasized this. Subsequent statistics have shown that most vesicoenteric fistulae are inflammatory. Perforation of a carcinoma-bearing bowel

takes place more often above the obstructing growth in a non-adherent loop, and peritonitis or localized abscess results and not a vesical fistula. Pneumaturic fistulae are generally considered difficult to cure. Pneumaturia, if not caused by a prostatic abscess broken through into the rectum, means perforation of a sigmoid diverticulum into the bladder. The only case of such pneumaturia that I observed was cured.

The following is a case of pneumaturia caused by a diverticulum breaking through into the bladder:

CASE IX. G. P. C., male, aged fifty, was referred to me March 17, 1918, by Dr. Guy Kiefer. He complained that he had had abdominal distress all his life. Six weeks before coming to me he had two spells of severe abdominal pain and since then he had passed flatus through the urethra. The cystoscope showed a cystitis and perhaps an ulcer in the left upper part of the bladder. Roentgenograms suggested a sigmoid tumor. The patient was slightly septic from his cystitis. I operated on March 22, 1918, the record reading as follows:

"Six-inch incision through outer edge of left rectus from level of umbilicus downward. Sigmoid is attached at end of middle third to left outer angle of bladder by an ulcerative process, perforating into both organs. Ulceration does not feel cancerous, but more like flat perforating ulcer. Bladder and sigmoid easily separated. No escape of contents. Perforations are the size of a knitting needle. Bladder ulceration excised, and oversutured by one row of submucous sutures and a double row of Lembert sutures. The hole in sigmoid being located in immobile part, resection with anastomosis seems impracticable. It is also oversutured and reinforced by two fat tabs. Drainage." Complete cure.

The microscopical examination of the ulcer removed from the bladder and bowel showed it to be inflammatory and not malignant.

Commentary: At that time we were not clear as to what caused this ulcerative perforation of the sigmoid into the bladder. Since then many cases have been reported which make clear that it was a perforation of a diverticulum into the bladder. Kelly

and McCallum first, in 1898, described this process as pneumaturia.<sup>9</sup>

#### 8. Gangrene of Scrotum and Ischiorectal Abscess from Diverticulitis

Another relation of diverticulitis of the sigmoid to diseases of the genitourinary organs has been brought out in an article by Rankin and Judd.<sup>10</sup> In this article the authors prove that a diverticulum in the lower part of the sigmoid may become

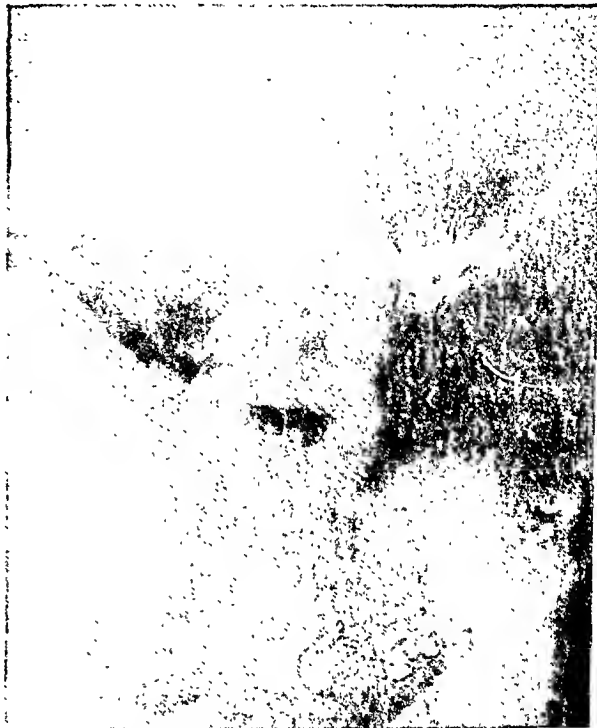


FIG. 2. CASE IX. Diverticula of colon showing twenty-four hours after administration of opaque meal.

attached to the lateral wall of the bladder and perforate there, and that the urinary extravasation so created follows a very definite route, owing to the arrangement of the fascial planes in the perineum through which the urethra passes, and results in gangrene of the scrotum. During the past two or three years, we have had 2 such cases at Harper Hospital. These were in middle-aged men brought to the hospital with acute, black slough of the scrotal tissues and some gas formation in the tissues, in a condition of severe sepsis and giving the picture of a perforated urethra. Neither of these patients

had had any trauma or history of any stricture that could have accounted for the severe septic infiltration of the tissues. Both patients died. I have no doubt that the article mentioned makes clear that these acute gangrenous processes of the scrotum are due to anaerobic bacteria from a perforating diverticulum. Diverticulitis may burrow along other pathways. A low-lying diverticulitis or a diverticulitis of the rectum may burrow into the ischiorectal fossa; an intractable, perianal fistula ensues. The end stage of this is generally loss of rectal continence from repeated operations on the anal canal.

#### TREATMENT

By reason of the variability of the symptoms, the treatment of diverticulitis will be manifold. In chronic cases (vi and vii) we have seen that a waste-free diet of meats, fish, eggs, fats, etc., without vegetables, will lessen the fecal matter and render the stool free of cellulose fibers, which removes somewhat the danger of hard masses stagnating in the diverticula. Colonic irrigations will serve the latter purpose also and relieve the frequent desire for stool. In acute cases, severity of symptoms, appearance of the patient, temperature, pulse rate, rigidity of muscles and leucocytosis will be proper guides for therapy. Perforations obviously need surgical intervention. Drainage and isolation of the perforated bowel will be the method of choice (Cases ii and v); actual suture of this type of perforation with highly infected fecal matter damaging the intestinal wall will hardly ever be possible as in perforating ulcer of the stomach and duodenum. Abscesses have to be drained. Resections will be performed chiefly in subacute cases when limited portions of the sigmoid are affected so that some anastomosis is possible (Case i). Extension of the diverticula over the whole of the sigmoid and upper rectum, also inflammatory swelling of mesosigmoid and mesocolon will doubtless indicate resections. Temporary or permanent colos-

tomies or enterostomies may be indicated to keep the infecting feces from the area of the diverticulitis (Case ii). If a diverticulum has perforated it may heal by being taken up into the scar tissue, but diverticula are usually multiple and repeated perforations and abscesses have been observed (Case iii). In Case iv, an ileosigmoidostomy was performed and excluded the inflamed area of diverticulitis. If cancer has formed, starting from a diverticulum, general rules pertaining to operability will prevail.

In sigmoidovesical fistula, separation of bowel from bladder and suture of both, with drainage, accomplished a cure in Case ix.

It may be well to add that the mere presence of diverticula (diverticulosis) should not be an indication for any surgical interference and, even if symptoms are present, careful consideration whether the symptoms demand this type of aggressive surgery is necessary. Also do not forget that diverticula may be present and still some other affection may cause the symptoms. Very instructive was the following case in this relation:

CASE X. Male. Patient was referred by a prominent physician for operation for diverticulitis. He had severe left-sided abdominal and lumbar pain, and some dysuria. In a routine examination multiple diverticula of the sigmoid had been found. As the symptoms were not harmonious with the ones usual in diverticulitis (severity of pain and loss of weight aroused suspicion), further roentgenograms were made which showed malignant disease of the left sacroiliac region, no doubt secondary to prostatic cancer.

#### CONCLUSION

In concluding, the following points are emphasized:

1. Diverticulitis of the sigmoid causes a great variety of symptoms: acute perforative peritonitis, perisigmoidal abscess, recurring attacks of inflammation, chronic intestinal irritations (gas, pain) and rectal tenesmus.

2. Diverticulitis causes dysuria by adhesions to bladder and inflammatory edema around the ureter. Pneumaturia from vesicosigmoid fistula is nearly always due to perforation of a diverticulum into the bladder.

3. Abscesses starting from diverticulitis may appear on the surface as ischio-rectal abscess; rare cases of gangrene of the scrotum are also due to such burrowing abscesses.

4. Chronic inflammatory stricture of upper rectum and sigmoid is in some cases caused by diverticulitis.

5. Inflammatory swelling of the sigmoidal wall around the inflamed diverticula has often erroneously been taken for cancer of the sigmoid. On the other hand, diverticula of the colon are a causative factor in the formation of cancer.

6. Diverticulitis of the sigmoid is quite frequent, but is not recognized sufficiently thus far. The diverticula are very small, and after inflammatory changes have taken place, are not distinguishable from the thickened intestinal wall. Roentgenography will show only in a certain percentage the presence of diverticula. They can be demonstrated three or four days after an opaque meal, when barium remains in the sacculi after the bowel is emptied.

7. Treatment: waste-free diet and

colonic irrigations in chronic cases; drainage in perforations and abscesses; resections of the intestine or colostomies as may be indicated.

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## SURGICAL SUGGESTIONS

MANY paronychias begin as an abscess under the nail fold and can be cured, without incision, by lifting the fold up from the nail with the flat of a probe, scalpel or toothpick. A small wet dressing (with or without a minute drain, as seems desirable) completes the cure in a day or two, as a rule.

# DIVERTICULITIS OF THE SIGMOID ASSOCIATED WITH TUBERCULOSIS

## REPORT OF TWO CASES\*

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THE recognition of the rôle of diverticula in producing masses resembling cancer in the left lower quadrant of the abdomen has been the greatest contribution to the pathology of this region during the present century. Mayo, Wilson and Griffin,<sup>3</sup> and Moynihan<sup>4</sup> described accurately the appearances in diverticulitis and peridiverticulitis of the sigmoid, and thus enabled a large bulk of these inflammatory swellings in the left lower quadrant to be taken out of the category of sigmoiditis or pericolitis sinistra in which they had been previously included. Furthermore, increasing clinical experience with this condition resulted in its differentiation from carcinoma and hyperplastic tuberculosis of the sigmoid with which it had been frequently confused.

Hyperplastic tuberculosis of the colon, on the other hand, is a very rare condition, rarer in reality than a survey of the literature would suggest. This is probably owing to the fact that, previous to the adequate recognition of diverticulitis as a clinical entity, many of the granulomatous tumors characteristic of this disease were classified as tuberculous. For instance Kidd,<sup>1</sup> in 1907, under the heading of hyperplastic tuberculous pericolitis, described three cases, two of which at least, in the light of present knowledge, would be classified as chronic diverticulitis.

On the other hand, the coexistence of diverticulitis and tuberculosis of the sigmoid has never been previously stressed, as far as I am aware. The report of the following two cases, the only two recognized in a series of more than 100 cases of surgical diverticulitis examined, seems

justified therefore in the light of the unusual pathological data.

## REPORT OF CASES

CASE 1. A clergyman, aged forty-eight, came to the Mayo Clinic December 8, 1920, complaining of bladder trouble. There was no history of tuberculosis in the family and none of previous illness of any kind. About eight months before admission, following a period of three weeks' continuous pain in the perineum, there was a sudden subsidence of the pain, followed by the discharge of pus and blood from the urethra with the two subsequent voidings. Pus was noted in the urine for about seven months, but blood from the urethra was never noted again, although occasionally it was present in the stool. There was moderate nocturia, but no difficulty in starting the stream, and no dribbling afterward. Gas was frequently passed through the urethra, and occasionally flaky material resembling feces was noted in the urine after purging. Following the onset of urinary symptoms the patient irrigated the bladder himself daily with mild silver protein solution for three months, but finally discontinued this on account of the unsatisfactory results obtained. At the time of examination at the Clinic, he still complained of the pain and irritation on urination. His appetite was good. There was no history of indigestion, nor any complaint of constipation. There was no history of attacks of abdominal pain.

The patient was well-nourished and well-developed; his color was good. He weighed 178 pounds and was not aware of any loss of weight. The urine contained albumin 1 and pus 4. The hemoglobin was 70 per cent and the leucocytes numbered 4800. The phenolsulphonaphthalein test for renal function gave a return of 55 per cent. Roentgenological examination of the colon revealed a filling defect in the sigmoid with

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multiple diverticula. Cystoscopic examination showed chronic diffuse cystitis. The meatuses of the ureters were normal in appearance, but there was an opening in the dome of the bladder with a small central slough.

Vesicosigmoidal fistula from perforating diverticulitis of the sigmoid was diagnosed, and operation was performed December 16. The abdomen was opened by a low midline incision and the diagnosis of diverticulitis of the sigmoid with perforation into the dome of the bladder was confirmed. The fistula was separated from the bladder, and the opening in the

bladder closed with two purse-string sutures of chromicized catgut. The inflammatory mass of sigmoid was freed, about 18 cm. were resected and end-to-end anastomosis was performed. The appendix was brought out through a small stab wound, and a catheter was tied into the cecum. A retention catheter was left in the bladder.

Recovery was uninterrupted. The patient went home on the twenty-second day after operation, the main wound having healed, and there being only slight drainage from the appendiceal stoma. He remained well for nearly



FIG. 1. Case 1. Low-power photomicrograph of a longitudinal section of the bowel wall, cutting through a diverticulum around which there was evidence of acute inflammation macroscopically. Two long, narrow diverticula can be seen, the longer extending beyond the muscular coat, with its apex in the thickened subserous coat. The mucous membrane lining the diverticulum is intact up to the point where the diverticulum passes beyond the plane of the muscular layer of the bowel. In what was the cupola of the diverticulum, the continuity of the mucous lining is gradually lost, the gland crypts are disintegrated and necrotic, and around the apex of the diverticulum they have completely disappeared. The area corresponding to the original lumen of the sac is replaced by a mass of inflammatory exudate consisting of fibrin and polymorphonuclear leucocytes, while beyond, represented in the illustration by darker areas, the inflammatory exudate is densely cellular, with lymphocytes and plasma cells predominating. A feature of this area also is the proportionately large number of eosinophilic leucocytes. On the margin of this dense inflammatory zone there are numerous miliary tubercles and giant cells. They can be seen in the low magnification but are better seen in Figure 2, which is a high-power photomicrograph of the same area. Beyond the inflammatory zone, the subserous coat is represented by a broad layer of fibrous connective tissue of moderate density, completely replacing the fat in the proximal portion, and in the distal portion towards the peritoneum being represented by numerous strands of fibrous tissue enclosing islands of fat. The blood vessels are congested and have small collections of lymphocytes and plasma cells in their vicinity.

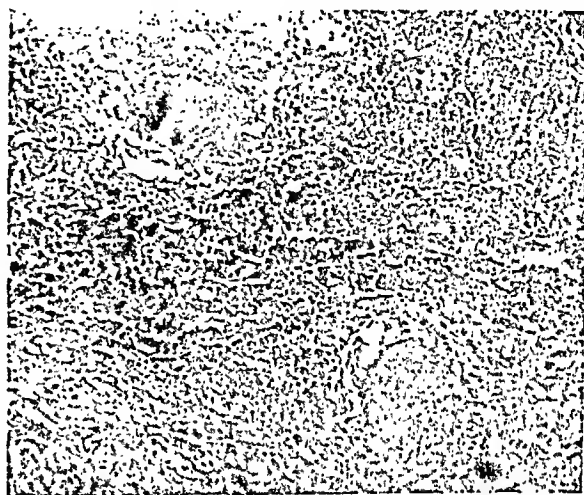


FIG. 2. Case 1. High-power photomicrograph of portion of the subserous coat of the bowel showing typical miliary tubercles.  $\times 120$ .

two years but returned to the Clinic on account of swelling of the testes from which he had been suffering for about ten months. There was then a draining sinus in the scrotum in the discharge from which bacilli of tuberculosis were found. Bilateral epididymectomy and left orchidectomy were performed. When the patient was heard from a year later he was perfectly well.

*Pathological Description of the Operative Specimen.* The portion of the sigmoid resected at operation presented the macroscopical appearance typical of diverticulitis. It was a thickened, hard, fibro-fatty mass, but the thickness of the wall varied in different parts. The mucosa was typically rugose, but free from ulceration. When the gross specimen was cut open diverticular cavities were seen, their apices abutting on the fatty subserous coat. The subserous coat was considerably thickened and strands of fibrous tissue passed through it to reach the peritoneal surface. There was no evidence of peritonitis. The microscopical appearance is illustrated in Figures 1 and 2.



**CASE II.** A man, aged fifty-five, of sedentary occupation, was admitted to the Clinic January 10, 1926, complaining of obstruction of the bowels. There was no family history of tuberculosis. He had suffered from typhoid fever at the age of twenty-two. An exploratory operation and colostomy had been performed elsewhere about four months previously. Since 1918 he had passed a small but noticeable quantity of blood by the bowel at intervals of three or four months, and had suffered from constipation during that period. Following

ingestants. The colonic stoma functioned well. The blood pressure was 158/90. The urine contained a trace of albumin, and pos. 1. The hemoglobin was 80 per cent; the erythrocytes numbered 5,210,000 and the leucocytes 8300. Roentgenogram of the chest showed fibrosis of the apices, probably the result of old tuberculosis. Roentgenogram of the colon (Fig. 3) showed a markedly contracted descending colon and sigmoid, and a filling defect in the lower loop of the sigmoid. Proctoscopic examination showed contraction of the bands suggestive of



FIG. 3. Case II. Roentgenogram of the colon showing a filling defect in the lower sigmoid flexure.

an operation for inguinal hernia in 1924, he began to suffer from occasional lower abdominal cramps. Discomfort would come on shortly after eating. He would have frequent desire to go to stool, but would pass only a small quantity of mucus streaked with blood. This state continued for eighteen months, during the whole of which time he obtained some relief from the free use of laxatives. In September, 1925, roentgenograms of the colon showed an obstructive lesion of the sigmoid, and an exploratory operation was carried out. A freely movable mass was found in the sigmoid resembling diverticulitis or carcinoma, and colostomy was performed through the left rectus muscle. The man's condition improved and he gained weight.

The patient appeared healthy and weighed 147 pounds, an increase of 12 pounds since the colostomy. There was slight clubbing of the

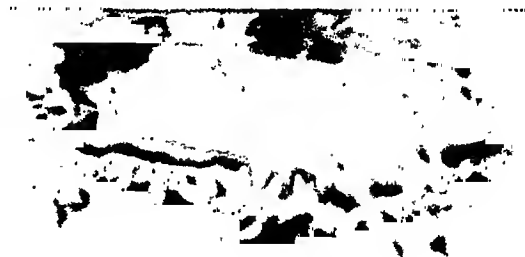


FIG. 4. Case II. Macroscopic appearance of specimen removed at operation showing diverticulum and peridiverticulitis.

diverticular formation, and no malignant tissue was seen. The Wassermann reaction was negative. In view of the length of the history and the fairly good condition of the patient, benign lesion of the sigmoid, probably diverticulitis, was diagnosed.

At operation, January 23, 1926, a tumor of the rectosigmoid was found, and it was difficult to determine before resection whether it was due to diverticulitis or to carcinoma. A conservative resection of the rectosigmoid was followed by end-to-end anastomosis. It was a difficult procedure as the colonic stoma was only a few inches above the growth. About a week after operation, pleurisy and bronchopneumonia developed and went on to bronchiectasis. Although life was prolonged for several weeks by special efforts, the patient died in March. Necropsy was refused.

**Pathological Examination of the Operative Specimen.** The fifteen centimeters of the sigmoid removed showed tremendous increase of the subserous fat which stood out in tuberos masses corresponding to the coalesced appendices epiploicae. The regional lymph nodes were normal in size and appearance. The mucous membrane was rugose, but without evidence of ulceration. The appearance of the

opened specimen was typical of diverticulitis (Fig. 4). Several long narrow diverticula were seen passing up between the fibers of the muscular coat, and extending into the subserous coat. The continuity of the largest of the diverticula could not be followed in the subserous coat on account of some inflammatory softening and necrosis in the region. The subserous coat, as a whole, was thickened to more than 2.5 cm. It had a bluish-white homogeneous appearance, and was almost cartilaginous in consistence, especially in the

were coexistent. This case, reported by Turner, differs however from those reported here in that the tuberculosis was of the ulcerative type and developed on a false diverticulum of the cecum. Ulcerative tuberculosis of the cecum is fairly common, but true diverticula in this region are practically never the site of inflammatory complications such as are met with in the sigmoid flexure.

Both diverticulitis of the colon and

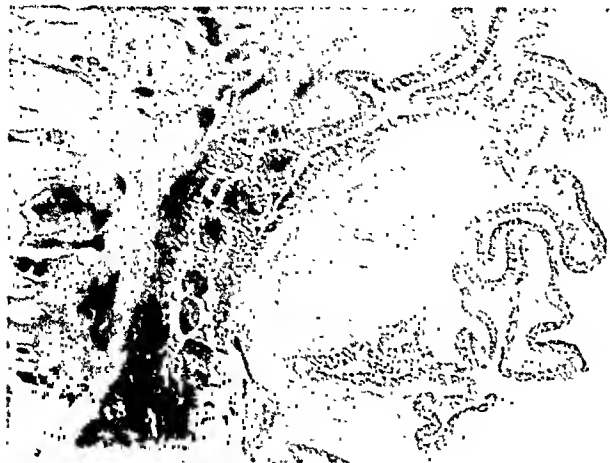


FIG. 5. Case 11. Photomicrograph, under very low power, of a section through the largest diverticulum, which showed inflammatory changes macroscopically. The appearances are so similar to those described in Figure 1, that no detailed description is necessary. Here again, the infection is of the mixed type, the lumen of the diverticulum being filled with polymorphonuclear leucocytes, while the neighboring cellular exudate is mainly lymphocytic, but with a good sprinkling of cells of the polymorphonuclear type. Numerous typical tubercles with giant cells are present just beyond the zone of densest infiltration. The mucous lining of the apex of the diverticulum is destroyed. The hyperplastic layer of dense fibrous connective tissue in the subserous coat, typical of peridiverticulitis, is well shown.

vicinity of the diverticula. Strands of fibrous connective tissue were visible passing up towards the peritoneal surface, and enclosing islands of yellowish fat. There was evidence of acute inflammation around the largest of the diverticula. There was no evidence of peritonitis. The microscopical appearance is illustrated in Figures 5 and 6.

#### DISCUSSION

The two cases just described, essentially similar in general, present quite unique pathological features. I have been able to find only one case in the literature in which diverticula of the colon and tuberculosis



FIG. 6. Case 11. Portion of the subserous coat of the bowel showing miliary tubercle with central giant cell under high magnification.  $\times 60$ .

hyperplastic tuberculosis, especially of the subserous type, are capable of producing almost identical pathological pictures. When they are coexistent, there is great difficulty in assessing the part which each plays in the production of the granulomatous tumor.

Hyperplastic tuberculosis of the colon is a rare condition. Lockhart-Mummery<sup>2</sup> states that of 100 cases noted by him in the literature, eighty-seven were in the cecum and ascending colon, and only six in the sigmoid. He further states, as emphasizing the great rarity of the condition, that there is not one specimen in the museum of the Royal College of Surgeons. There are two types of hyperplastic tuberculosis of the colon, the submucous and the subserous. It is the latter type, in which the subserous coat is the seat of fibrous connective-tissue hyperplasia and lymphocytic infiltration, that mimics most closely chronic diverticulitis and peridiverticulitis.

The submucous coat may be almost unaffected, and the mucous membrane is usually devoid of ulceration. The hyperplastic nature of this disease, together with the absence of caseation, distinguishes it as a manifestation of tuberculosis quite unlike the lesions usually encountered in other organs. Lockhart-Mummery states that in most of the recorded cases there were no symptoms of tuberculosis elsewhere in the body, and that in the cases in which necropsy was performed careful examination failed to reveal any other lesion of the kind. In both the cases recorded here there was evidence of tuberculosis elsewhere in the body, in the first case in the genitourinary tract, and in the second in the lungs; this would point rather to infection of the colon through the blood stream than from the lumen of the bowel. There is the possibility in the first case, however, that the infection of the genitourinary tract was secondary to the establishment of the fistulous communication between the bowel and the bladder.

On the other hand, the pathological findings in these two cases, with the exception of the miliary tubercles, the giant cells, and the increase in the eosinophilic leucocytes, were typical of diverticulitis. Inasmuch as diverticulitis of the sigmoid is a comparatively common condition, and tuberculosis of the sigmoid exceptionally rare, the latter can be diagnosed only after the most careful microscopical examination. It has been stated that giant cells may be found in the lesions of diverticulitis, and that their presence must not be taken as necessarily indicating the tuberculous nature of a lesion. This statement is probably true, but it has been my experience, in studying the resected specimens of surgical diverticulitis at the Mayo Clinic, that giant cells are rare and that if present they are not the centers of the formations that occur in tuberculosis. The demonstration of the bacilli in the tissues is, of course, the conclusive link in the chain of evidence, but in the type of tuberculosis of the bowel under discussion the bacilli are exceedingly

scanty; they could not be demonstrated in the cases presented here. In these two cases the pathological picture was one of acute perforating diverticulitis superimposed on chronic hyperplastic inflammation of long standing. Ordinarily, the perforation of a diverticulum is dependent on a heightening of the virulence of the organisms contained within the sac, but in these cases the possibility of the tuberculous process having involved the apices of the diverticula with precipitation of progressive inflammation has to be borne in mind.

Inasmuch as the symptoms of hyperplastic tuberculosis of the sigmoid are identical with those of diverticulitis, a differential diagnosis of these conditions is not possible until after operation, nor is it at all necessary, for the treatment is the same in both instances. At the same time there is a value, more than academic, in the recognition of tuberculous lesions in what appears to be a typical case of diverticulitis. It may, for example, modify the ultimate prognosis, as in Case 1 in which the patient returned two years later with tuberculosis of the genitourinary tract. Again, so few cases of tuberculosis of the sigmoid of the hyperplastic type have been described that our knowledge of the condition is still incomplete. It is hoped that this report will focus attention on the possibility of such a complication, and that more such material will be studied pathologically.

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# DIAGNOSIS IN ACUTE MECHANICAL INTESTINAL OBSTRUCTION\*

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THE present situation with regard to acute intestinal obstruction is analogous to that of acute appendicitis years ago. Then surgeons were clamoring for earlier diagnosis and operation to lower the mortality. The laity, as well as the profession, today know the advantages of early diagnosis and operation in acute appendicitis. The same effort should be initiated with reference to acute intestinal obstruction.

Despite extensive experimental study of this surgical entity and the increased interest in the subject evidenced by numerous clinical contributions in the current literature, the fact remains that a diagnosis is not made soon enough after the onset of the initial symptoms, and thus the resultant toxemia manifests itself to such a degree that when operation is resorted to it is often futile. With this viewpoint in mind, an attempt is here made to bring out some of the more important facts in relation to early diagnosis.

This presentation is based upon an analysis of 128 cases admitted to Harlem Hospital during the past ten years and observations made upon animal experimentation.

The patients were first carefully questioned with a view to determining some factor causative of the obstruction (Table 1). There were found 36 cases of non-reducible hernias: 2 ventral, 13 femoral, 20 inguinal, and 1 Richter's hernia. The last-mentioned hernia is the one most frequently overlooked. In this form, only a part of the intestinal wall is caught in the hernial ring, producing an acute angulation

of the gut. The usual situation is at the crural or femoral canal. It may also be found in the epigastric region. Of 3 cases not included in this series, 2 were discovered after the abdomen had been opened, while in the third a correct pre-operative diagnosis was made.

Thirty-seven patients gave a history of previous operation, which suggested the causative factor for the existing obstruction. In only one was the cause of obstruction other than that of an adhesion resulting from a previous operation. Here an intussusception was found, which had no relation to the operation for ruptured appendix. Twenty of these cases of obstruction developed subsequent to appendectomies. Two were due to adhesions from hernioplasties, and one followed splenectomy. In 8 cases the type of operation could not be determined; 5 followed various gynecological procedures.

Previous abdominal inflammations were responsible for the formation of adhesions in the following ten instances: 1 case of acute salpingitis, 1 pelvic abscess, 1 septic endometritis, 1 empyema of the gall bladder, and 6 cases of an unknown inflammatory nature.

Chronic constipation was the only previous factor elicited in 7 cases. At operation, a tumor pressing on the lumen of the gut, a complete twist of the small gut, and a loop caught under a band between two contiguous loops were found as the respective causes of the obstruction in 3 cases. Of the remaining 4 cases, 3 gave a history of constipation alternating with diarrhea, together with the explosive evacuation of

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TABLE I  
THE DIAGNOSIS FROM THE ETIOLOGICAL STANDPOINT

Strangulated Hernia		Previous Operations		Abdominal Inflammations		Chronic Constipation		Blood and Mucus		No Previous Factor	
Ventral	2	Appendix	20	Salpingitis	1	Tumor with-		Intussuscep-		Intussuscep-	
Femoral	13	Appendix	1	Pelvic abscess	1	out	1	tion	13	tion	2
Inguinal	20	Intussuscep-		Septic endo-		Complete twist				Meckel's di-	
Richter's	1	tion found		metritis	1	of small gut	1			verticulum	1
		Hernia	2	Empyema of		Band and				Congenital	
		Ruptured		gall bladder	1	loop	1			pouches	2
		spleen	1	Questionable		Carcinomas of				Bands in scler-	
		Gynecological	5	abdominal in-		large bowel	3			osing periton-	
		Questionable	8	flammations	6	Stricture of				itis	16
						rectum	1			Omental hernia	1
										Fibroid uterus;	
										adhesions	2
										Volvulus	1
36		37		10		7		13		25	

cherry juice stools. The diagnosis of carcinoma was proved in each instance upon proctoscopic examination. The last was a stricture of the rectum. These types of cases emphasize the value of an examination by rectum as a routine procedure.

The history of blood and mucus in the stools suggested the diagnosis of intussusception in 13 cases. Palpation of a sausage-shaped tumor verified these findings. Blood and mucus may appear in the stool in three other conditions: mesenteric thrombosis or embolism, carcinoma of the gut and the spontaneous partial release of an internal strangulation. In mesenteric thrombosis or embolism, the age of the patient and the condition of the heart and arteries suggests the underlying pathological process; in carcinoma, proctoscopic examination may reveal the condition, while intestinal strangulation is usually diagnosed only upon exploratory celiotomy.

The histories of the remaining 25 cases of this series did not indicate any etiological factors for the obstruction. Operation showed that in 16 cases the obstruction was due to bands and adhesions, the result of a chronic sclerosing peritonitis of unknown origin. Of the remaining cases, 2 intussusceptions, without blood, mucus or tumor, 1 Meckel's diverticulum, 1 volvulus of the sigmoid, 2 internal congenital

hernial pouches, 1 internal hernia through a rent in the omentum, and 2 fibroid uteri with adhesions were responsible for the obstruction. These conditions should be borne in mind when the etiology does not suggest a cause for the obstruction. The value of vaginal examination is demonstrated in the 2 cases of uterine fibroids, although in both instances before operation the obstructions were not associated with the pelvic condition.

A consideration of the various etiological factors suggested the diagnosis and cause of the obstruction in 99 cases.

The occurrence of the symptom triad: obstipation, pain and vomiting, is most significant. Obstipation was present in the majority of cases. Care must be taken in evaluating this symptom, because in some instances the intestinal contents below the obstruction were expelled spontaneously or as the result of enemas, with temporary relief. This constitutes one of the pitfalls to be guarded against in early diagnosis. The passing of blood and mucus, as already stated, is an important diagnostic sign. Pain was present in all cases. Vomiting occurred as the primary or initial symptom common to all acute abdominal conditions, and was maintained secondarily as a result of mechanical obstruction and peritoneal irritation.

On the basis of animal experimentation,<sup>1</sup> mechanical intestinal obstruction may be classified into the following two types: Type 1 includes all cases of obstruction due to bands, adhesions, tumors, etc., where there is an occlusion of the lumen of the intestinal tract. Type 2, in addition to the mechanical occlusion of Type 1, is characterized by the partial or complete interference with the circulation in a segment or loop of gut, as in volvulus and strangulated hernia. Intussusception and mesenteric thrombosis are apparent exceptions to this classification. Here, theoretically, the lumen is open, but practically it is closed, since the segment of the bowel with disturbed circulation acts as a mechanical block; the obstruction is therefore clearly of Type 2.

From a study of the relationship between the symptoms of obstipation, pain and vomiting, the obstipation-pain-vomiting (o.p.v.) ratio was derived. There was a marked difference between Type 1 and Type 2. In Type 1, the o.p.v. ratio may be represented by the horizontal position of the letters (o.p.v.), while in Type 2 the o.p.v. ratio may be represented by the

vertical position of the letters  $\begin{pmatrix} o \\ p \\ v \end{pmatrix}$ . An

example of Type 1 is represented by a case of carcinoma of the large intestine, with a history of obstipation for six or eight days, pain for four or five days, and vomiting for two days. Type 2 may be exemplified by a case of strangulated hernia in which obstipation, pain and vomiting occur from within a few minutes to several hours after the development of the lesion. This is not a hard and fast rule, but its consideration is of diagnostic significance in cases in which an etiological factor is not discernible. The occurrence of symptoms, if represented by the vertical position, suggests a volvulus or strangulated loop of gut, whereas if they occur in the horizontal

position, a simple obstruction of the gut is to be thought of.

The character of the pain, in most of the cases, was described as cramp-like or colicky. In Type 1 the pain is intermittent and gradually increases in severity, whereas in Type 2 the pain is initially more severe and more constant.

The vomiting of primary emesis consists of stomach contents entirely, whereas secondary emesis may be of gastric origin at the outset, but soon becomes bile-stained. Later the contents of the upper gut appear and finally the vomitus becomes fecal in character. The diagnosis should be made long before fecal vomiting occurs. Fecal vomiting is never present in high intestinal obstruction. As a result of emesis or stomach washing, the diagnosis has not infrequently been delayed in cases of obstruction where bile-stained vomitus persisted.

The accessory symptoms and signs occur later, and the diagnosis of intestinal obstruction should be made before they arise. The temperature is not significant and may become subnormal when the toxemia of obstruction fully develops. Gangrenous or ruptured gangrenous gut with peritonitis is associated with a rise in temperature, provided that the toxemia has not prostrated the patient so that no febrile reaction is possible.

The pulse is very deceptive. A very important fact to bear in mind is that delay in operative interference, to await disturbances of the pulse rate, is dangerous. The pulse usually remains comparatively slow until the toxemia fully develops, and then suddenly becomes rapid and thready in character. The early slow pulse rate is perhaps ascribable to irritation of the vagus; the inhibitory influence of the nerves is exercised until this is abolished by the toxemia.

Tenderness is to be elicited in practically all of the cases. The maximum point of tenderness is not always reliable in determining the site of the obstruction. Abdominal rigidity is usually absent, except later

<sup>1</sup> Eisberg, H. B. Experimental intestinal obstruction, a study in severed gut obstruction and segmental obstruction. *Ann. Surg.*, 1921, lxxiv, 584-609.

in the disease; in numerous instances it never developed.

The tumor of an intussusception, if palpable, is, of course, diagnostic; its absence, however, does not preclude the existence of that condition, as illustrated in 3 cases in this series. In volvulus of the large intestine, the involved loop rapidly distends. On percussion, a tympanitic note is elicited, which within several hours may be demonstrated throughout the entire abdomen. The case in this series was observed two hours after onset of the obstruction, and within six hours the entire abdomen was so distended that a marked dyspnea resulted. Gurgling may be heard if the abdomen is lightly percussed with simultaneous auscultation. The gurgling suddenly ceases at the site of the obstruction.

As already stated, the diagnosis was established in 99 cases on the basis of a consideration of the etiological factors. The symptoms and signs that presented themselves verified the diagnosis. In the remaining 29 cases, the diagnosis was correctly made in 28 upon the interpretation of the symptoms and signs alone. In 4 of these cases an etiological factor was present but it did not suggest the cause of obstruction. A mistake was made in 1 case, which was diagnosed as an acute appendicitis, and at operation an intussusception was found at the ileocecal valve. There was no palpable tumor nor was there blood or mucus in the stools.

The nature of the underlying pathological process in which there was no previous etiological factor given, was recognized by the analysis of the symptoms and signs in the case of volvulus of the sigmoid. The interpretation of the O.P.V. ratio established that a segmental obstruction was present in 2 cases of sclerosing peritonitis of unknown origin, in 1 an internal omental hernia, and in 1 an internal hernia found in a congenital pouch. The actual cause of the obstruction in the remaining cases was demonstrated at operation.

The laboratory findings in the blood and

urine were of a confirmatory nature. The urine, in intestinal obstruction, should be examined for indican and phenol, but the examination, to be of any value, must be made every two or three hours. If other conditions that may be responsible for an increase of indican and phenol are excluded, the findings in obstruction can be summarized as follows: In high duodenal and jejunal obstructions the urine reaction is negative for indican and for phenol. Lower obstructions, up to the ileocecal valve, give a positive indican reaction, with increasing intensity the longer the obstruction exists, while the phenol reaction is negative. Obstruction of the large gut is attended with a positive phenol and later a positive indican reaction.

Leucocytosis, with a high percentage of polymorphonuclear cells in Type 1 obstruction, indicates a complication of some kind. A normal count is of negative value, as there is no devitalization of tissue.

A low count early in Type 2 means that devitalization of tissue has not yet occurred. Late in the disease a low count, with a moderate increase of the polymorphonuclear cells, is indicative of devitalized tissue and signifies a lack of resistance with a consequent grave prognosis. Leucocytosis, with a high percentage of polymorphonuclear cells, suggests the presence of devitalized tissue with fair resistance.

The study of the blood chemistry (non-protein nitrogen, urea nitrogen, uric acid, creatinine, and the carbon dioxide combining power) is of great aid in questionable cases and furnishes corroborative evidence in clearly defined cases. After the operation a similar analysis of the blood is of great value in making a prognosis and in determining the question of a secondary operation. Experimentally and clinically, Connors and others<sup>1</sup> showed that the first change to be noted was a rise in the non-protein nitrogen. In Type 1, due to

<sup>1</sup> Connors, J. F., Killian, J. A., and Eisberg, H. B. Chemical changes in the blood in intestinal obstruction. *Proc. Soc. Exper. Biol. & Med.*, 1922-1923, xx, 358-360.



TABLE II  
THE DIAGNOSIS FROM THE CLINICO-PATHOLOGICAL STANDPOINT  
Chemical Changes in the Blood in Experimental Intestinal Obstruction (Type 1, Simple)

Dog	Time	Blood Analysis			Remarks
		Non-Protein Nitrogen	Urea Nitrogen	CO <sub>2</sub> Combining Power Per Cent	
		Mg. per 100 c.c.			
90	Preoperative	34	17.5	57	Simple duodenal obstruction
	24 hrs. Postoperative	37	15.0	51	
	47 hrs. Postoperative	43	15.9	35	
91	Preoperative	29	15.0	58	Simple ileal obstruction
	24 hrs. Postoperative	36	13.9	40	
	48 hrs. Postoperative	35.5	14.1	37	
	70 hrs. Postoperative	43.0	10.9	30	
92	Preoperative	32.7	14.8	52	Simple colon obstruction
	4 hrs. Postoperative	33.0	14.3	47	
	24 hrs. Postoperative	37.0	15.7	50	
	70 hrs. Postoperative	43.0	16.2	48	
	142 hrs. Postoperative	32.0	13.7	52	
	14 days Postoperative	28.0	14.5	57	

TABLE III  
THE DIAGNOSIS FROM THE CLINICO-PATHOLOGICAL STANDPOINT  
Chemical Changes in the Blood in Experimental Intestinal Obstruction (Type 2, Segmental)

Dog	Time	Blood Analysis			Remarks
		Non-Protein Nitrogen	Urea Nitrogen	CO <sub>2</sub> Combining Power Per Cent	
		Mg. per 100 c.c.			
93	Preoperative	25.3	14.0	56	Segmental duodenal obstruction
	4 hrs. Postoperative	27.6	12.9	43	
	18 hrs. Postoperative	33.2	10.7	40	
99	Preoperative	23.0	10.7	49	Segmental ileal obstruction
	5 hrs. Postoperative	30.0	9.6	42	
	29 hrs. Postoperative	32.0	12.0	37	
95	Preoperative	31.3	16.0	57	Segmental colon obstruction
	4 hrs. Postoperative	39.0	15.3	42	
	24 hrs. Postoperative	47.0	13.0	27	

simple or band obstruction, the nearer the obstruction was to the duodenum, the more rapid was the increase in non-protein nitrogen. A similar rise is noted in segmental, or Type 2, obstruction. Here, however, the rise is much greater and more rapid than in simple obstruction at the same level. There is noted in Type 1 a decrease in the alkaline reserve, as shown by the

carbon-dioxide combining power. In Type 2 this decrease is more marked. The uric acid contents are increased above the normal. The urea nitrogen rises in some instances and falls in others. The creatinine values vary, and their significance is not readily explained (*cf.* Tables 2, 3, 4, 5).

Late in the disease, regardless of the type, the diagnosis presents no difficulties,

TABLE IV  
THE DIAGNOSIS FROM THE CLINICO-PATHOLOGICAL STANDPOINT  
Chemical Changes in the Blood in Clinical Intestinal Obstruction (Type I, Simple)

Case	Date	Blood Analysis				Remarks
		Non-Protein Nitrogen	Urea Nitrogen	Uric Acid	Creatinine	
		Mg. per 100 c.c.				
I. T. G.	8/30/21 Preoperative*	65	29.7	....	2.5	Simple gut obstruction, band, jejunum
	8/31/21 Postoperative	57.3	29.0	....	...	
	9/ 2/21 Postoperative	38.0	20.1	....	2.5	
	9/ 4/21 Postoperative	36.3	18.7	....	2.2	
II. L. P.	11/ 5/21 Preoperative*	....	51.3	10.9	2.3	Simple gut obstruction, band, ileum
	11/ 6/21 Postoperative	....	50.0	12.2	2.1	
	11/ 7/21 Postoperative	....	32.3	9.1	2.1	
	11/13/21 Postoperative	....	15.0	3.8	2.0	
	11/20/21 Postoperative	....	12.0	4.0	2.0	
III. C. T.	10/17/21 Preoperative*	....	14.8	....	1.6	Simple gut obstruction, carcinoma of the ascending colon. Cecum opened 10/28/21. Re-established 11/14/21. Died 11/21/21.
	10/27/21 Preoperative	....	21.6	....	1.8	
	10/28/21 Postoperative	....	25.0	....	2.5	
	10/28/21 Postoperative	....	25.2	....	2.6	
	10/30/21 Postoperative	....	25.8	....	3.2	
	11/ 7/21 Postoperative	....	13.1	....	1.6	
	11/14/21 Postoperative	....	18.1	....	2.0	

\*Preoperative specimens not normal as patient had been obstructed for several days. Compare with normal preoperative specimen of the canine (Tables II and III).

TABLE V  
THE DIAGNOSIS FROM THE CLINICO-PATHOLOGICAL STANDPOINT  
Chemical Changes in the Blood in Clinical Intestinal Obstruction (Type 2, Segmental)

Case	Date	Blood Analysis					Remarks
		Non-Protein Nitrogen	Urea Nitrogen	Uric Acid	Creatinine	CO <sub>2</sub> Combining Power Per Cent	
		Mg. per 100 c.c.					
iv. N. M.	11/19/21 Postoperative	51.0	18.4	5.9	2.9	41.0	Segmental gut obstruction. Umbilical hernia
	12 /2/21 Postoperative	60.0	20.6	4.4	3.5	46.0	
	12/24/21 Postoperative	83.0	34.0	9.2	4.5	65.3	
v. M. R.	8/25/21 Preoperative*	36.2	12.1	2.2	1.9	....	Segmental obstruction of ileum by inguinal hernia
	8/26/21 Postoperative	47.2	28.7	5.0	...	....	
	8/28/21 Postoperative	68.0	28.0	3.3	...	....	
	8/30/21 Postoperative	....	28.4	2.4			
	9/ 1/21 Postoperative	37.2	24.0	2.8	2.6		

\* Preoperative specimens not normal as patient had been obstructed for several days. Compare with normal preoperative specimen of the canine (Tables II and III).

but the prognosis is grave. Early in the disease the diagnosis is not always easy, but the prognosis is good. A case that gives a history of intermittent or constant cramp-like abdominal pains, vomiting and

obstipation, should be considered one of mechanical intestinal obstruction. Relief by gastric lavage and high colonic enemas with return of feces should not be permitted to cloud the issue. A return to the

previous clinical picture after a few hours should be regarded as justifying exploratory celiotomy, even if the diagnosis is not clear. A rise in the non-protein nitrogen, and of uric acid in the blood and a fall in the carbon-dioxide combining power, with or without an excess of indican and phenol in the urine, may be regarded as making an exploratory operation imperative, especially in those cases in which a definite etiological factor gives no clue to the obstruction.

In this connection one type of case must not be overlooked. The patient gives a history of chronic constipation and rather suddenly develops pain in the abdomen with vomiting. Catharsis and enemas are not followed by evacuation of the bowel. Here examination of the rectum may reveal a fecal impaction.

It is most important to differentiate mechanical obstruction from those conditions associated with paralytic ileus that are really not surgical, and from those in which, though surgical, operation may be deferred. The differential diagnosis from other acute surgical conditions that require immediate operation is not absolutely essential, as is the early recognition of the acute surgical abdomen.

In pneumonia and other medical diseases with a complicating paralytic ileus, the

differentiation, as a rule, is easy. The pain of paralytic ileus is usually more of a sensation of discomfort, and not cramp-like, griping or colicky. The paralytic ileus associated with renal or gall-bladder colic at times presents difficulties, but a careful analysis of the history of the pain and other symptoms and signs, with the aid of the laboratory, generally serves as a correct guide as to which condition is present. The differentiation in the third instance, between acute hemorrhagic pancreatitis and high intestinal obstruction, is of no great moment, since operation is imperative in both.

The mechanical obstruction that immediately follows other postoperative conditions, such as a loop caught in a uterine suspension operation, or an inflammatory band from a ruptured appendix, is the most difficult to diagnose. Since a postoperative paralytic ileus alone may occur in each instance, the most valuable aid here is the careful analysis of the pain following these operations. Two to four days after operation, the onset of colicky pain, intermittent and increasing or constant in severity, associated with obstipation and vomiting, is strongly indicative of a mechanical obstruction. When in doubt, one should not hesitate to make the diagnosis by operation.



## SURGICAL SUGGESTIONS

NEITHER carbolic nor cresolic solutions, however dilute, should ever be used on fingers or toes as a dressing. These and bichloride of mercury tablets ought to be rigidly excluded from the family medicine closet. There is no purpose for which they are used wherein less dangerous remedies cannot be employed.

# HIGH INTESTINAL OBSTRUCTION CAUSED BY PRIMARY CARCINOMA OF THE PROXIMAL JEJUNUM

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NEW growths that block the upper part of the small intestine, particularly the upper portion of the jejunum, are usually overlooked and often are not suspected until late symptoms of complete obstruction appear.

The cardinal signs of the ordinary low bowel obstruction, namely, general abdominal distention, fecal vomiting, high pulse rate, great toxemia and prostration, are usually absent in a high obstruction. In the later stages of the disease, if a fistulous tract connects the upper jejunum with the large intestine or coils of lower small intestine, fecal vomiting may be present. The vomiting of bile, often in large quantities, in high obstruction is attributed ordinarily to a "bilious attack," gall-bladder disease, or ulcer of the stomach or duodenum.

Fortunately, jejunal carcinoma near the ligament of Treitz is very uncommon; usually it is discovered at autopsy, or when the abdomen is opened, without a roentgen-ray diagnosis, for symptoms pointing to peptic ulcer or cancer, disease of the gall bladder or the bile ducts, or chronic appendicitis with pain and tenderness referred to the epigastrium.

As in the following cases, the obstructing growth, even if causing complete or nearly complete blocking of the intestinal lumen, may be only the size of the normal jejunal width, and may be well covered by the stomach, transverse colon and omentum. Hence, in early cases, the mass is not readily palpable.

The stomach and the four parts of the duodenum, being proximal to the growth, are naturally distended when filled, but this is not always noticed because of the vomiting and easy emptying of a relatively

short segment of obstructed gastrointestinal tract.

The absence of fecal vomiting and abdominal distention is very misleading; there is usually no visible peristalsis in early cases, mainly because the duodenum is retroperitoneal, and the stomach is not dilated at that time. Physical examination in early cases is usually negative; the abdomen is soft and no masses may be felt. In the three cases reported below, pulse rate, temperature and respiration were normal, and there had been marked loss of weight.

## OCCURRENCE

Nothnagel<sup>14</sup> reported nine instances of carcinoma of the jejunum in 3585 carcinoma deaths. He observed that the duodenum is almost as frequently involved by carcinomatous lesions as the whole jejunum and ileum together. Allbutt and Rolleston<sup>2</sup> note that primary carcinoma of the jejunum is very rare. In 19 cases, the average age was forty-six, being fifty and two-tenths years in the 11 males, and forty years in 8 females. They state that the growth may be either a spheroidal-celled, or a cylindrical-celled carcinoma. Multiplicity of the tumors is not due to implantation or to metastases, but to independent foci of growth.

Kaspar<sup>10</sup> believes that there is always a possibility that one is dealing with a metastatic tumor, and this factor must be excluded in considering cases, as of primary carcinoma. He thinks that there are but 40 published cases of primary carcinoma of the small intestine that can be considered as diagnosed correctly. The sites of predilection for primary carcinoma are the upper

jejunum and the lower ileum. Kummer has noted that they may be single or multiple. Finsterer states that these growths usually occur at between fifty and seventy years of age.

### SYMPTOMS

Vomiting is the most prominent symptom in the early stages of the disease. It usually follows a sense of pressure, fullness and distress in the epigastrium after eating. A large amount may be vomited, sometimes half a pail full, usually containing bile and pancreatic juices and not fecal in odor or appearance, in high obstruction. When the growth is low down in the jejunum, or has formed a fistulous tract with neighboring viscera, fecal vomiting may occur.

Bailey<sup>3</sup> states that there are no symptoms characteristic of primary jejunal carcinoma in the early stages, except those common to a chronic, progressive, intestinal obstruction.

Epigastric pain and tenderness, nausea, colic and, in the later stages, alternating obstinate constipation and diarrhea may be present. Visible peristalsis is a late symptom and, according to Tuttle,<sup>19</sup> is preceded by irregular, griping pains. Bulging of the epigastrium may also be present; this may be due to a distended stomach or to an immensely thickened and dilated loop of jejunum immediately below the duodenojejunal angle, as reported by Whittemore.<sup>21</sup>

One or more masses may be felt, usually in the epigastrium. Nothnagel states that carcinomas of the jejunum are particularly mobile unless bound down by adhesions. They are very prone to prolapse, and they are often found in the lower abdomen, in the right iliac fossa or pelvis when the growth is situated in the lower jejunum. Bailey writes that if a movable tumor is palpated, this is sufficient evidence for a tentative diagnosis of jejunal carcinoma. He reported a case where the tumor could not be palpated until the patient was anesthetized, and at operation

he found a growth the size of an orange, 18 in. below the ligament of Treitz. A second, small adenocarcinoma was found 4 ft. below the first.

Keyser<sup>11</sup> operated upon a woman thirty-eight years old who had a tumor the size of a cocoanut in the first part of the jejunum which had perforated into the transverse and descending colons.

Seidelin<sup>16</sup> reported a jejunal carcinoma from an aberrant pancreas.

Soper<sup>17</sup> noted, in a man aged forty-nine, a growth 3 in. below the beginning of the jejunum, and another growth the size of a lemon 15 in. below it.

Johnson<sup>9</sup> observed a man aged thirty-two who had for two weeks abdominal fullness and vomiting. There was a rolling sensation in the upper abdomen after eating, and from time to time he noticed a transverse swelling below the umbilicus. At operation a growth was found 3 to 4 ft. from the duodenojejunal flexure.

Osler<sup>12</sup> states that the low jejunal carcinoma symptoms are similar to those of carcinoma of the first portion of the colon, with occult blood almost always present in the stools. He believes that the nearer the carcinoma is to the stomach, the more profound are the cachexia and anemia, which of course appear in the late cases, with hemorrhage from the bowel.

Because of the fluid nature of the small intestinal contents, new growths in the small bowel do not give rise to symptoms of obstruction as early as those in the colon.

Aizner<sup>1</sup> suggests examining the stools for blood, pus, tubercle bacilli and tumor elements.

### DIAGNOSIS

With the symptoms already mentioned, a diagnosis of high obstruction may be made readily by roentgenographic and fluoroscopic examination, using the barium meal. In a case of high jejunal obstruction Bevan<sup>4</sup> noted under the fluoroscope a small lake of barium remaining for a few minutes in the upper part of the small

intestine, shortly after it had passed through the duodenum. At operation, he found a carcinoma about as large as a silver half dollar, 12 in. from the duodenojejunal junction. With a tumor low in the jejunum, the stomach may empty well within normal limits.

*Differential Diagnosis.* Benign tumors such as leiomyoma and polypoid growths in the upper intestinal tract may cause the same symptoms. Congenital pyloric stenosis produces projectile vomiting, as does congenital atresia of, or bands of adhesions about, the duodenum. Diverticula of the duodenum are readily demonstrated by roentgen-ray examination. I have noticed in my private practice that acute partial enterocoele causing obstruction high in the jejunum simulates a carcinoma, as does intussusception in this region.

Acute dilatation or carcinoma of the stomach or duodenum, cysts of the pancreas and of the mesentery, obstructing enteroliths, tuberculous ulcers or gummas may cause similar symptoms. Without roentgen rays, ulcers of the stomach, duodenum or jejunum, as well as inflammation of the pancreas and biliary passages, or chronic appendicitis, are often diagnosed.

Chronic digestive disturbances usually labelled "bilious attacks," "dyspepsia," and "acute indigestion," associated with vomiting, pain and tenderness in the epigastrium, are to be looked upon with suspicion. If, in addition, there is repeatedly a sense of fullness, pressure and distress in the pit of the abdomen, these symptoms should be considered as probable evidence of pathological conditions that may urgently demand surgical intervention. Thorough roentgen-ray examination is most essential and it usually clinches the diagnosis.

#### PROGNOSIS

In these cases, resection of the carcinoma with a wide margin and removal of its mesentery, with proper anastomosis, has

resulted in a mortality of 17 per cent according to Kaspar.<sup>10</sup> Of course, the earlier the diagnosis is made; the better are the operative and end results.

#### TREATMENT

Early surgical removal of the growth and its mesentery, including a wide margin of surrounding tissue, with proper anastomosis, gives the best results. If the tumor is at, or near, the ligament of Treitz, a preliminary gastroenterostomy should be done, preferably under local anesthesia. A blood transfusion should be performed at the same time, if required. Subsequently, the growth may be removed, when the patient's condition warrants the second-stage operation. It is important to inspect the rest of the small and large intestine as well as the liver, to make sure that there are no other lesions.

Carlson<sup>5</sup> writes that an exploratory laparotomy is imperative whenever a person is constantly losing weight without known cause, whether at the cancer age or not, with fixed pain in the abdomen, alternating constipation and diarrhea, and attacks of colic.

#### CASE REPORTS

**CASE 1.** (Private patient.) Female, aged sixty, Christian Scientist, married, no children. She was a thin, wiry type of individual, who minimized her symptoms. The past history was negative. The chief complaint was nausea and vomiting of bile, often in large amounts, 2 to 4 qts. at a time, accompanied by distress and fullness in the epigastrium. The vomiting relieved these symptoms. She complained also of dull pain in the back, in the vicinity of the right scapula, and dull pain across the abdomen at the umbilical level. After persistent emesis, some fresh and changed blood appeared in the vomitus. She thought that she had lost about 20 lbs. in weight. She stated that she had vomited bile at intervals for two to three weeks, but subsequently it was learned that the vomiting covered a period of two to three months. The patient had taken a small amount of liquid food often, but after half an hour she usually vomited it. Her bowels had been

constipated, but cathartics had kept them open.

She stated that after taking liquids she felt "full," and puffed out in the epigastrie and umbilical regions. General physical examination was negative. A roentgen-ray examination was strongly advised, but the patient "didn't believe in x-rays." A probable diagnosis of cholecystitis was made. Three weeks later roentgen-ray examination was again urged and Dr. Arial George demonstrated obstruction of the small intestine at the ligament of Treitz. He reported:

"An examination of the gall-bladder region and entire gastrointestinal tract showed an enormous dilatation of the second and third portions of the duodenum, which I feel, in view of the fact that in six hours there is only a small percentage of the barium meal passed into the jejunum, represents a definite obstructive lesion. There is nothing seen on the films that would give any clue to the nature of the obstruction."

At operation the stomach and duodenum were found greatly distended, and just distal to the ligament of Treitz was presumed to be carcinomatous obstruction of the jejunum. The intestinal lumen was wholly occluded by a hard, smooth mass the size of a large walnut. The adjacent glands in the mesentery of the jejunum were enlarged. There were no metastases in the liver, and abdominal examination was otherwise negative. A two-stage operation was decided upon, so a preliminary posterior gastroenterostomy was performed, uniting the stomach with the jejunum distal to the growth. There was little or no shock to the operation, and the patient was returned to bed with a pulse of 100. Three hours later she died with symptoms of pulmonary embolism. Autopsy was not obtainable.

I am indebted to Dr. Lund for the privilege of reporting the following case:

**CASE II:** A widow, fifty-two years of age, was examined by me in the Surgical Out-Patient Department of the Boston City Hospital, and sent into the hospital for surgical treatment. There was a mass the size of a golf ball to the left of the umbilicus and an ovarian cyst in the pelvis. She had done housework for several years and worked full time until ten days before entering the hospital. Her appetite had been good; there had been no diarrhea,

jaundice, bloody or tarry stools. About fifteen months prior to entrance, she noticed she was losing weight, about 20 lbs., and became fatigued more easily. For three weeks she had had sharp pains in the abdomen, more marked to the left of the umbilicus. Vomiting had been associated with these attacks. The patient had had considerable distress and rumbling over the whole abdomen. The bowels were constipated, being moved about every third day with Epsom salts.

Roentgen-ray report by Dr. Paul Butler was:

"Barium enema showed no evidence of obstruction or irregularity of outline of the large intestine. A barium meal revealed a stomach low and large, with sluggish peristalsis. No definite irregularity of gastric contour was noted. The duodenal cap was large but regular in outline. The second, third and fourth portions of the duodenum were markedly distended. There was definite delay in the passage of barium through the duodenum. At the five-hour examination there was a large residue in the stomach. There was no displacement of the small bowel. At the twenty-four-hour examination the stomach was empty; there was considerable residue in the ileum. The colon was low and stringy. The cecum was regular, not freely movable and there was no tenderness over it. The distention of the duodenum and delay in emptying of the stomach were considered consistent with an obstructive lesion in the region of the duodenojejunal junction."

Reexamination was advised to confirm the findings. The diagnosis was deferred by the roentgen-ray department and the patient was discharged to the Out-Patient Department with a diagnosis of syphilis. Two weeks later I found a mass the size of a golf ball to the left of the umbilicus, and bimanual examination revealed an ovarian cyst in the pelvis, as in the previous examination in the Out-Patient Department.

The patient was admitted to Dr. Lund's service. The pain was now localized high in the left upper abdomen. There was marked constipation. She complained of easy fatigue, loss of weight and pallor. A diagnosis of possible malignancy of the bowel was made.

At operation a mass about the size of a golf ball was found involving the jejunum and the transverse colon. The mass was dissected out, and a resection of about 30 cm. of bowel was



made. An end-to-end anastomosis of the duodenum to jejunum was performed, and the mass in the transverse colon was excised. There was considerable induration of the mesentery of the affected jejunum, but no involvement of the liver. The gall bladder was full of stones, and there were multiple cysts in the pelvis. The patient was returned to bed in fair condition. She died two days later. The pathological diagnosis by Dr. F. B. Mallory was adenocarcinoma. Following is the report:

"The specimen consists of a piece of the small intestine (jejunum) measuring 25 cm. in length. In the middle is a hard, ulcerated, flattened mass, 3 by 4 cm. in diameter, which extends for 2 to 3 cm. through the muscularis and into the mesenteric fat tissue. On section the cut surface appears pinkish gray with creamy punctate mottling.

"Microscopically, a tumor of epithelial type is invading extensively the intestinal wall. In places it is very cellular (medullary) in type, but in other areas it appears scirrhous with few cells and much stroma. The cells grow partly in glandular form, but mostly in solid masses. The tumor has extended through the muscle wall and in places is invading the fat tissue beneath the serosa. It is also undermining the mucosa."

I thank Dr. David D. Scannell for the opportunity of reporting another probable case of carcinoma of the jejunum:

CASE 111. Widow, fifty years of age, a factory worker of Syrian descent. The admission diagnosis was chronic intestinal obstruction. The chief complaint was abdominal pain for three to four months prior to entrance to the Boston City Hospital. The patient had vague abdominal pain, increasing in severity and in frequency until three months previously. She had been confined to her bed since then. The pain had no relation to her meals, and was definitely colicky in nature, coming on in waves at very frequent intervals, all over the abdomen, and worse in the right lower quadrant. The bowels were always constipated, sometimes going for a week without an evacuation. She vomited frequently, but with no relation to meals. She felt that the pain and vomiting were worse when she was constipated, and the pain was relieved for a short time after a bowel movement. She said she had lost 35 lbs. in weight during

the preceding three months. She was feeble, poorly developed and nourished, with marked cachexia and dry, wrinkled skin.

The barium-meal roentgenograms were quite puzzling. The first and second series of plates showed no large mass of barium proximal to the growth. The last series did show the mass described below, and it was thought that some barium had been spilled on the table or on the patient's abdomen. The first plates showed merely the presence of a fairly large amount of barium throughout the small intestine without demonstrating obstruction at any one point. The roentgen-ray report by Dr. Paul Butler was:

"Stomach is high and appears displaced upward. The greater curvature in region of antrum shows a convexity which suggests pressure. The duodenum shows no filling defects. At five hours stomach is empty. At twenty-four hours, head of meal is at rectum. There is large residue in small bowel which appears to be markedly distended. Colon is also distended. Enema shows no evidences of obstruction or irregularity. Transverse colon high and displaced upward. Reexamination shows stomach high, small bowel tremendously distended and a large pouch-like formation about the size of an orange lying about the midline and apparently connected with small bowel. At five hours, entire meal is in small bowel. The ileum is about normal in size, the large collection of barium previously noted is still filled and the small bowel proximal to this is markedly distended. At twenty-four hours head of meal is at rectum. Distended loops of small bowel are still visible and there is a residue in the pouch also. Roentgen-ray diagnosis: 1. Probably diverticulum of small bowel. 2. Marked distention and delay in small bowel."

The blood Wassermann reaction was negative. The white blood count was 6,500, hemoglobin 70 per cent, and red blood count 4,030,000. The urine was negative. Physical examination was otherwise negative.

Under ether anesthesia, an incision was made to the left of the umbilicus. Distended small bowel, averaging 6 cm. in diameter, was found. Collapsed small intestine was then found, and proximal to the collapsed bowel there was a hard annular stricture, evidently carcinoma of the small intestine with a lumen not more than 1 cm. in diameter. Just proximal to

the stricture was a large, floppy, thick-walled, empty, collapsed segment of small gut about 12 cm. in diameter at its widest part. In the course of the next 15 cm. proximally, this distended bag gradually tapered down to the previously mentioned distended small intestine. There were no palpable glands in the mesentery of the small gut anywhere near the stricture. Resection was considered absolutely inadvisable because of the poor condition of the patient, therefore a lateral short-circuiting anastomosis was quickly and easily done, about 25 cm. above and 10 cm. below the stricture. A second-stage operation of resection was planned with removal of the stricture and the proximal 20 cm. or 25 cm. of excessively distended small intestine, preferably under local anesthesia, but the patient died on the following day. No autopsy was obtainable.

#### CONCLUSIONS

1. High intestinal obstruction due to primary carcinoma of the jejunum may be diagnosed if early and thorough serial barium roentgenographic and fluoroscopic examinations are made.

2. If the carcinoma is situated at or near the duodenojejunal angle, a two-stage operation under novocaine anesthesia is the procedure of choice; a gastroenterostomy being performed at first, and the growth removed at the second operation.

3. If the growth is found lower in the jejunum, an enteroenterostomy may be done well above and below the mass, and the tumor and its mesentery removed at a subsequent operation.

4. A whole blood or a citrated blood transfusion of 500 c.c. or more should be done early, and repeated, if necessary, before, during or after operation.

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# HUGE FIBROMA OF MESENTERY

## RESECTION OF SIX FEET OF JEJUNUM: RECOVERY

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Surgeon to Grant Hospital

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JUDD and McVay, of the Mayo Clinic, reported a case of fibromyoma of the mesentery in *Surgery, Gynecology and Obstetrics*,<sup>1</sup> and in connection therewith they brought the literature on the subject up to that date. This shows that lipomas of the mesentery are the most common solid tumors in that region and fibromas the rarest, probably less than fifty being on record.

Since the appearance of this report, as appears in the files of the Library of the Surgeon-General's Office, Jacoby<sup>2</sup> reported the removal of a small fibroid of the mesentery of the ileum, weighing less than a pound and necessitating resection of the bowel; and Kyle has reported<sup>3</sup> the successful removal of a three-pound mesenteric fibroid, with 6 inches of the ileum.

Mrs. P. L., colored; aged twenty-four; one child, aged three years; labor normal; appetite good; bowels regular; urine normal; menstruation regular and normal; no loss of flesh, no swelling of feet or ankles. Patient first noticed an abdominal tumor in April, 1925. It grew very rapidly, and in July she was operated upon at Mt. Carmel Hospital. On opening the abdomen the surgeon found a large tumor, with loops of bowel adherent in front. He decided that it was malignant, and closed the abdomen without removing any tissue. The patient left the hospital in due time. A month or two later she consulted another surgeon, who after keeping her under observation for a day at Grant Hospital sent her home as inoperable.

I saw her at the Cancer Clinic February 5, 1926. The tumor had been increasing in size, she said, but not with any great rapidity. It was very hard. The patient's general good health, however, seemed to me to preclude malignancy. The "feel" of the tumor was not that of a lipoma, but was exactly that of a very large fibroid. Pelvic examination showed no connection of the tumor with the pelvic organs. My diagnosis, therefore, was a retroperitoneal fibroid. The conditions were bad but not hopeless, and a frank statement to that effect was made to the patient and her friends. She entered Grant Hospital February 25, and I operated the next day. The old scar was a long one, extending from above the umbilicus to the pubes. Assuming the presence of adhesions under the scar, the incision was started higher up. This was fortunate as very extensive adhesions were found between the tumor and the anterior abdominal wall. I finally extended the incision downward the full length of the old scar. A loop of bowel was found, running diagonally across the tumor from above downward. This was spread out like a broad ribbon and it was evident that the fibroid so involved the mesentery that the bowel would have to be sacrificed. It was accordingly detached from the tumor, which was then separated from its adhesions and enucleated. Its pedicle was very vascular and high up under the transverse colon, at the extreme upper end of the root of the mesentery. Getting the tumor out of the way, it was found necessary to excise over 6 feet of jejunum. This left just enough of the jejunum below the transverse colon to permit an anastomosis with a Murphy button. The toilet of the peritoneum was completed; the gap in the mesentery was closed to prevent a possible hernia; a cigarette drain was put in to the point of anastomosis; the omentum was drawn down so as to still further protect; and the incision was closed.

The patient made an uninterrupted con-

<sup>1</sup> Judd, E. S., and McVay, J. R. Fibromyoma of the mesentery. *Surg., Gynec. & Obst.*, Chicago, 1920, xxxi, 372-375.

<sup>2</sup> Jacoby, A. Fibroma of the mesentery; report of a case. *N. York M. J.*, 1920, cxii, 66.

<sup>3</sup> Kyle, H. G. Fibroma of the mesentery. *Brit. J. Surg.*, Bristol, 1921-1922, ix, 295.

valescence, but for several weeks was annoyed by frequency of bowel movements. Examination of the patient at her home, August 26, 1926, showed her in excellent health, weighing 120 lbs., this being more than she had ever weighed before. Bowels entirely regular. She had just returned that day from an 800 mile automobile trip.

The tumor weighed just 25 lbs.; its dimensions:  $13 \times 12 \times 7\frac{1}{2}$  in.; largest girth 40 in. Microscopical examination by several pathologists demonstrated that it was a pure fibroma. It was presented to the museum of the Medical Department of Ohio State University.

Doran, in 1904, reported a case of abdominal tumor which in some way got into the literature as a "fibroma of the mesentery." It weighed 30 lbs. Examination of his report in the original shows that the tumor was retroperitoneal, that it had not developed between the folds of the mesentery at all, and that he made no claim for

it as a mesenteric fibroid. Its size and consistency were such that before operating he thought he was dealing with an ovarian tumor. He describes the contents as "jelly-like myxomatous material." The later histological report was that it was a "fibromyxoma which has undergone diffuse myxomatous degeneration." The tumor was so soft as to present a "distinct feeling of fluctuation," and "simulated cystic disease of the right ovary." On incising it "a quantity of yellow serum came away. . . . The tumor was entirely retroperitoneal." He "enucleated the tumor with ease. . . . The myxomatous change was universal." Doran's case (which is included in the Judd and McVay bibliography) being thus clearly eliminated from fibroid tumors of the mesentery, the literature leaves my own case by several pounds the largest recorded mesenteric fibroid ever removed.



## SURGICAL SUGGESTIONS

IF A child will not open his mouth for an examination of the throat, pass a probe between the teeth to the pharynx. Instantly the mouth will open and a tongue depressor or gag can be slipped in.

MANY physicians prescribe liquor alumini acetatis and Burow's solution on all occasions for bruises, cuts and skin infections. These quite similar preparations are good as a wet dressing under suitable conditions; but if either is improperly prepared or insufficiently diluted it may cause a violent dermatitis. For home use, especially, it is better to order the much blander boric acid solution.

# AUTOMATIC INJECTOR FOR LOCAL ANESTHESIA

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LOCAL anesthesia gained a firm foothold among surgeons when novocaine was introduced by Einhorn in 1905 and since then its use has been increasing constantly throughout the civilized world. The chief objection to, and the main reason for, the failure of local anesthesia to replace general anesthesia to a great extent is the operative technique required in its use.

Successful operations under local anesthesia call for a surgical technique that emphasizes the delicate handling of tissues so much stressed during and after the War and so seldom practiced. The fact that local anesthesia requires considerable modification of technique has been one of the major factors in its slow progress. We still find in the United States that the majority of major operations are performed under general anesthesia, and the explanation is the inability of surgeons to adapt themselves to the change of technique necessary in the use of local. If the average surgeon would take sufficient time to study the epoch-making work of R. E. Farr of Minneapolis he would find that the technique is not nearly so difficult as it appears when first attempted. Farr has, perhaps better than any other man, demonstrated the possibilities of local to replace the more dangerous general anesthesia in the hands of the average surgeon. One of the principal factors in Farr's technique is his automatic injector. Another factor is infiltration block. Nerve blocking is very pretty when it works. Sparring for nerves by a busy surgeon who has not taken a year or two off to work on cadavers with dye injections is quite a game, a most gratifying game if he occasionally hits the nerve sheath and gets a good result. Anterior sacral, transsacral and sacral

block injections are best given as Farr gives them. The simplest method is more likely to be successful in the average surgeon's hands than the more complicated and spectacular.

I first began using local anesthesia with the hand syringes of various types in general use. With these I was able to perform the majority of my operations without great difficulty. Nerve blocking predominated. I then attempted to devise an automatic injector along the lines of Farr's admirable instrument and began following his technique with some slight modification.

The instrument described in this article is a simplified device and, at least in my hands, I think it has some features that might be credited as improvements over Farr's.

The technique of local anesthesia begins with first meeting and gaining the confidence of the patient. Inspire confidence in all possible ways, by contact with the surgeon, his associates, the nurses and other patients. One of the principal factors in destroying the patient's confidence in the ability to perform operations without pain with the patient awake are the stories told by doctors incompetent to perform the operation themselves and by patients who have had disagreeable experiences at the hands of untrained operators. Many surgeons are attempting, with some degree of success, nerve blocking and spinal anesthesia. In the hands of an expert, nerve blocking is the ideal method of performing operations by what is commonly known as regional anesthesia. This calls for a knowledge of anatomy not possessed by the average surgeon. I do not consider spinal anesthesia safe or satisfactory.

Having operated upon a large number of

cases under various general anesthetics, including chloroform, nitrous oxide, ethylene and ether, I am in a position to make a comparative study of local and general anesthesia. The known drawbacks of general anesthesia are too numerous to be more than touched upon in this paper, namely inability to obtain highly trained people to administer the anesthetic, death on the table, vomiting, postoperative hernias, and other after-effects that often defeat the object of the operation.

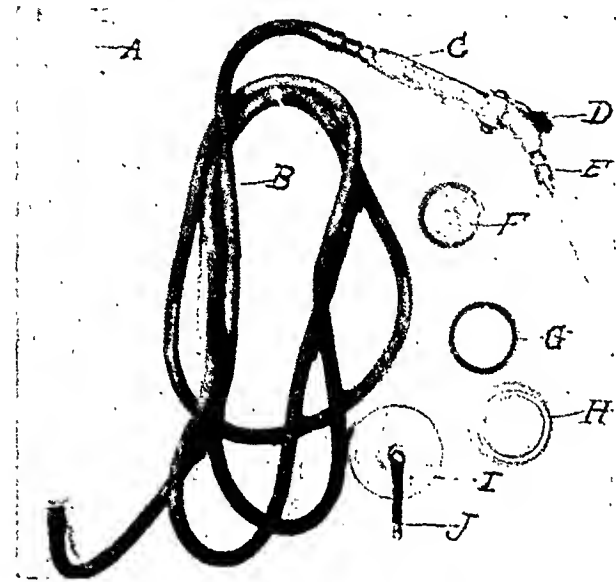


FIG. 1. The instrument taken down just as it is placed in the sterilizer, with other instruments, ready to boil. A. Salvarsan graduate. B. Pure gum tubing that will not stand over 40 lbs. pressure. This is to safeguard a careless nurse from turning too much pressure into the graduate and breaking the glass. The glass will stand more than the hose. C. Cut-off handle. This is made of aluminium, is very light and fits the hand. D. Lever controlling the valve. E. A small tap, with a slot, into which the needle fits and which prevents the needle from blowing off the injector. F. Small rubber diaphragm which fits in the tube of the salvarsan graduate. It has a small hole in the top. G. Collar which fits around the rim of the graduate and is directly opposite "F." H. Aluminium collar which fits snugly against "G" and holds it against the top of the graduate. I. Aluminium cap which screws tightly over "H" bringing it up against "G" and pressing down on "F." J. Stem to which is screwed the hose that connects with the oxygen tank.

The technique of using the automatic injector for laparotomies is as follows: A short No. 24 needle is used in making the first wheal. A 7 cm. No. 23 needle is then

placed in position on the handle and pushed firmly but gently through the initial wheal. The anesthetic is turned on full as the needle is pushed through the skin. The needle is then pushed upward where the incision is to be placed so that a large wheal is formed. The finger of the left hand is then placed firmly against the skin, depressing it so that the needle can be pushed at intervals of 1 cm. through the subcutaneous tissue which has already been anesthetized. The fascia (aponeurosis) is then anesthe-

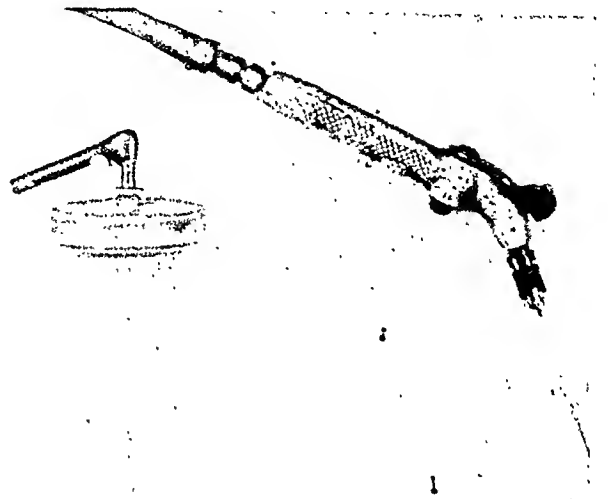


FIG. 2. The instrument set up and ready for use with the needle in position.

tized. This is done by placing the needle, with the anesthetic flowing against the fascia, at intervals the entire length of the wound. The needle is then pushed through the fascia along the line of the incision, anesthetizing the peritoneum and fascia. When the abdomen is opened the abdominal contents will fall away from the abdominal wall. The abdominal wall is then retracted upward and a beautiful exposure can be obtained. This applies to all regions of the abdomen.

If a gastrectomy is to be performed, 30 c.c. should be injected retroperitoneally in the region of the celiac axis. This produces a very excellent splanchnic block. The solution should be injected very slowly, for rapid injection will cause severe pain. The operation can then be performed without pain if no drag is made on the peri-

toneum. This calls for refinement in technique, careful handling of intestines, sharp dissection of adhesions, and no rough gauze. Laparotomy sponges are used less and less by the operator as his proficiency increases.

The apparatus here shown can be made at a very low cost. The one I am now using was made by the Toledo Technical Supply Company from a blueprint drawing. Several valuable modifications were made by Dr. McKesson. The total cost of the instrument can be saved in a few months



FIG. 3. Shows how well the handle fits the hand and how perfectly the valve is under control. A. Needle lock. B. Valve control.

on the number of broken syringes in the comparatively large clinic. This instrument has been used in one hundred and fifty cases. It is cleaned and set up by the operating room nurses and has become a part of the regular hospital equipment.

The principal advantage of the injector is that it does not tire the hands, the flow of the anesthetic is constant and is ahead of the needle, and the principal pain is avoided, namely, that at the time of injection. This is the time the patient loses confidence, his fears are magnified. If undue pain is caused by the injection of the anesthetic the surgeon will defeat himself and be obliged to continue under a general anesthetic.

In spite of the low toxicity of novocaine, caution should be observed in its administration and no more should be used than is necessary. I have found that the omission of adrenalin in the solution is an important factor. The nervous strain

under which a patient is placed is bound to influence the glands of internal secretion, especially the adrenals and thyroid. When 30 c.c. to 40 c.c. of local anesthetic with adrenalin are injected, a patient undergoing a major operation will complain of headache, faintness and nausea, will show rapid pulse and pallor, and become very nervous and apprehensive. This does not occur when adrenalin is omitted. I fail to find adrenalin a necessity in any operation performed under local anesthesia by the injection method. In topical application it may be useful. I have found it to be a decidedly harmful factor and have discontinued its use entirely. Its hemostatic properties are of little value and in general anesthesia are not present at all. I do not find that it prolongs the duration of the anesthesia as I very seldom have to make a second injection. A reinjection of the fascia and skin when the wound is to be closed is a very desirable procedure as it will assure the patient freedom from wound pain for at least an hour and a half and give him plenty of time to recover completely from any mental disturbance.

Psychic shock is often spoken of by surgeons doing an occasional operation with local anesthesia and it is very much discussed by those who still cling to general anesthesia. I have had many patients come for operation who would inquire concerning psychic shock. Of course these patients could not acquire any knowledge of such a thing as psychic shock except through some physician who was evidently arguing very strongly against operation under local anesthesia. In four hundred and fifty cases I have had one clinical case of shock. This was from an injured bladder and was in no way related to the anesthetic. Many patients who complained at the beginning or during the operation will frankly admit two days later that they had no pain. Crile's theory of psychic shock is interesting and may have some real value in certain patients.

The preoperative use of narcotics is unnecessary in local anesthesia but is



desirable in a large number of cases. My custom at present is to give  $\frac{1}{6}$  grain of morphine and a 0.02 grain of scopolamine an hour and a half before operation. This dose of scopolamine is, rarely, repeated when the patient is brought to the operating room. In such operations as hernioplasty and perineorrhaphy the narcotic is omitted as it is the frequent cause of vomiting. In patients who do not have a narcotic, vomiting is extremely rare under local anesthesia.

In regard to the time element, if the surgeon is so busy that this is a factor at the operating table, he had better pass the work on to somebody less busy. I do not consider time a factor in my operations; I am concerned rather with delicacy of technique, accuracy, the avoidance of any accident, perfect hemostasis, the elimination of shock and the procuring of results. However, we can enter the abdomen in an average time of five minutes after the operation is started, timing from the first injection. The time lost in the careful handling of tissues can be made up in the rapidity with which the abdomen can be closed by reason of its perfect relaxation.

With the automatic injector the time element as an objection is to a great extent overcome. The discomfort of the injection has been reduced to a minimum. The convenience of the instrument is so much greater that there is no comparison with syringes. The objection made by many surgeons that the amount of anesthetic cannot be accurately gauged does not hold. The amount of anesthetic, after

a few operations, can be gauged so accurately that the operator seldom has to look at the graduate to see how much he has used. In 90 per cent of cases my patients left the operating room with a normal pulse, normal respiration, and no pain. The largest amount of novocaine used in one single operation was 58 grains; the amount the patient absorbed was very much less. Much is wasted and a large amount escapes through the incision and, if adrenalin is not used, it drains out rapidly. A large amount of anesthetic is not required in the tissues. The nerve terminals seem to retain their anesthesia for one and a half hours or more. I have operated over a period of two and a half hours without reinjecting and without complaint from the patient.

The postoperative course of a patient operated upon for any abdominal condition is a revelation to the average surgeon accustomed to working under general anesthesia. The time in the hospital is shortened an average of two to five days. Postoperative discomfort is reduced to a minimum, gas pains are almost never experienced, and distention is seen so seldom as to be practically negligible.

The use of local anesthesia has been my routine over a period of seven years and I seldom use a general anesthetic unless the patient requests it.

I wish to acknowledge valuable suggestions and assistance in the development of this instrument from Drs. Floyd B. Sharp, M. Matanovich, and Thomas W. Woodman.



# CASE OF ACUTE POLIOMYELITIS OCCURRING IN THE COURSE OF TREATMENT OF FRACTURE OF THE FEMUR IN A CHILD OF TWO

DRS. IRENE DAVIS AND ANNA YOFFA

(From the Surgical Department, Cornell Medical School and the First Surgical Division of the New York Hospital)

ACUTE poliomyelitis as an inter-current disease in fracture of the femur in children is so uncommon and the result of the disease is so striking that the following case is worthy of publication.

George G., aged two and a half years, was admitted to the New York Hospital, First Surgical (Cornell) Division, March, 1924, with paralysis of the right leg. The mother, reliable, gave the following history:

*Family History.* Negative.

*Past History.* Normal delivery; child was never ill; walked at ten months; at no time did he limp.

*Present Illness.* In June, 1923, while in excellent health and playing on the porch, he fell a distance of two stories. He did not lose consciousness. At the hospital to which he was taken it was found that he had sustained a fracture of the right femur, and for six weeks he was under treatment there.

When discharged, on the fifth of August, the right leg was functionless. The child could not walk but would drag the leg in a flexed position, manipulating it by hand as he crawled on the floor. The mother was told at the hospital to teach the child to walk. Despite all effort to make him do so, the leg continued to be useless. While in the hospital (about the middle of July) the child had a sudden attack of vomiting which lasted a whole day and the mother had to stay with him. Since then he has been perfectly well except for the leg.

Through the courtesy of St. Vincent's Hospital, where the child was under treatment from June 21 to August 5, 1923, we were able to abstract the following from the history:

George G. was admitted June 21, 1923, with a fracture of the right femur which was confirmed by the roentgenray. He was a well-developed child about one and a half years old,

normal in every way except for fracture of the right femur. Treatment was by plaster of Paris on the right leg and Buck's extension frame for six weeks.

The temperature chart was normal up to July 13, when there was a sudden rise of temperature to 103° F. For the next four days it varied from 101° F. to 103° F. On the fifth day there was a sudden drop to normal where it remained until the date of discharge. On July 22, nine days after the onset of the temperature, there is a note that the child had gastroenteritis.

*Roentgen-ray Reports.* June 21, 1923: fracture of the middle third of the right femur with overriding of the fragments.

August 5, 1923: Union of the bone with overlapping of the fragments.

August 5, 1923: Discharged as cured, function o.k.

*Physical Examination.* The patient is a well-developed, well-nourished male child of two and one-half years, very bright and alert. He does not appear acutely ill. Most of the time he sits with his right leg flexed under him, and in attempting to stand he grasps some object such as the side of the crib and pulls himself up, dragging the limp right extremity behind him. When standing the patient bears all of his weight on the left lower extremity, but he does not stand squarely on the plantar surface of the left foot. Instead he has the foot dorsiflexed and the weight is borne on the heel, the knee being in hyperextension. The limp right lower extremity hangs in a semi-flexed position with a slight drop-foot. In order to move the right leg the child takes it in his hand and places it in the desired position.

There is a marked flattening of the right buttock and prominence of the right trochanter. The hip joint is freely movable and the thigh can be easily flexed on the abdomen. No limitation of abduction but some decrease

in adduction is found in the right lower extremity.

On deep palpation of the right thigh in the middle of the shaft of the femur, a thickened and hard enlargement about two and one-half inches long is felt (callus).

When the child is recumbent the right lower extremity is in slight abduction and lateral (external) rotation, and the foot is slightly plantarflexed. There is a shortening of the right lower extremity and a flaccid and atrophic paralysis of the muscles of the thigh and calf except for the psoas.

There is a weakness of the left calf muscles and some of the peroneal group, as evidenced by the fact that the tendo Achilles offers no resistance to pressure when the foot is in extreme dorsiflexion. The left foot can be passively flexed so that its dorsum almost touches the anterior tibial surface, while the right foot can be flexed only to a right angle. There are no deep reflexes in either extremity, and no sensory changes are present.

The following are the measurements of the two lower extremities: Anterior spine to malleolus: Right, 32 cm. Left, 33 cm. Trochanter to malleolus: Right, 18 cm. Left, 19 cm.

Roentgen-ray Report. There is an old fracture, well healed, of the middle third of the right femur. There is also a coxa vara of the neck of the right femur. (This latter is probably due to weight bearing on a weakened bone and occurred after the paralysis, because it was not found at the time of the first roentgen-ray examination. See report from St. Vincent's Hospital.)

Considering the frequency of poliomyelitis it is surprising that it has not occurred more often as an intercurrent disease in the fractures of children.

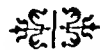
The case here reported illustrates the difficult situation which an attending surgeon might need to face should poliomyelitis occur during the treatment of a fracture.

In reviewing the literature, we were able to find but two cases that resembled this. In both, however, the diagnosis was made early. Dudgeon mentions a case reported in 1897 of acute poliomyelitis following soon after fracture. Ruhräh and Mayer mention a personal case of acute poliomyelitis occurring two weeks after fracture.

We wish to acknowledge our indebtedness to Dr. J. M. Hitzrot for permission to report this case and for his cooperation.

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## SURGICAL SUGGESTIONS

**T**INCTURE of iodine is a strong primary wound disinfectant, but its application is often painful and irritating especially when its strength has increased by evaporation. For household and general first-aid use, such unirritating and harmless antiseptics as the stable commercial "Dakin" preparations or mercurochrome solution are more desirable.

# TRANSACTIONS OF THE SECTION OF SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of December 3, 1926*

THE CHAIRMAN, DR. FREDERIC W. BANCROFT, PRESIDING

## CHILLS IN ACUTE APPENDICITIS

RALPH COLP, M.D.,

*(Author's Abstract)*

THE significance of chills in acute appendicitis is still obscure. In a series of 2841 cases of acute appendicitis admitted to the wards of Mount Sinai Hospital, New York, 6.8 per cent presented this symptom before operation. The degree and extent of the gross pathology found at the time of operation seemed to have little influence on or relationship with the occurrence of chills. Cases of acute catarrhal appendicitis developed a chill in 6.6 per cent of their number, those with frank gangrene in 6.7 per cent, those with peritoneal abscess in 6.7 per cent and those with a general diffuse peritonitis in 6.9 per cent. Seventy per cent of all rigors occurred within the first twenty-four hours. Cases presenting a chill later seemed associated with abscess formation or the onset of a general peritonitis.

The combined mortality of cases with chills was 6 per cent, the death rate of those without was 5.1 per cent. In cases of gangrenous appendicitis with chills, the mortality apparently increased from 2.6 per cent to 9 per cent. The death in 4 of these 6 cases was attributable to pylephlebitis.

Of 181 cases in which a single chill was recorded, 7 died, 2 from pylephlebitis, a mortality of 3.7 per cent, which was no higher than that for all cases without chill. In 11 cases in which chills were multiple before operation, 5 died from pylephlebitis. In cases with multiple

chills pylephlebitis is almost a foregone conclusion, and certainly in those cases a ligation or resection of the ileocolic vein should be done before the actual appendectomy.

Postoperative chills when none have been noted before are extremely rare; they were noted in 3 cases, 2 of which developed a fatal suppurative pylephlebitis.

### *Discussion*

DR. EDWIN BEER: The subject of this paper has interested me for many years, brought up as I was under the elder Gerster, who emphasized the importance of chills in acute appendicitis as a forerunner of portal involvement. I have always carefully watched my patients to see how many of them with chills developed portal involvement and have learned that Dr. Gerster overemphasized the importance of chills. I was therefore glad that Dr. Colp had found time to review some 3000 cases and put the matter definitely on its true basis. I was very much surprised to learn that in acute catarrhal cases chills were as prevalent as in perforation with abscess and in general peritonitis cases. I had no idea that chills would be reported in these cases to the number of 6 per cent. Repeated chills preoperatively are present in about 40 per cent of the cases that develop pylephlebitis, and if chills are repeated after appendectomy about 60 per cent will show portal phlebitis if I understand Dr. Colp's paper. If those figures are borne out in other hospitals, we will have a good idea of the significance of chills. The causation of these chills is one of the prettiest problems we have to face. How often the portal system is involved in acute appendicitis, nobody really knows. If it were as simple to test the blood stream in the portal as in the general circulation we would have a gauge of the bacterial invasion of the liver and portal system.

DR. ABRAHAM O. WILENSKY: I have been

interested in the subject of chills in acute appendicitis for a long time. Many patients with acute appendicitis have a single chill before operation, at the onset or on the second or third day of the attack. Operation shows a diversity of lesions and there are just as many appendices perforated as there are intact, and there are just as many with thrombosed vessels in the mesenterium as there are with open vessels. Unless the chill is repeated, it usually means very little, at least as far as the ultimate prognosis is concerned. In the presence of a chill, and of freely open vessels in the mesenterium, there is no reason why one should not assume that the lymphatics are involved and I believe that a fair number of chills in acute appendicitis is associated with a lymphangitis in the posterior abdominal wall, i.e., in the retroperitoneal spaces.

It is a different story when the chills are repeated after operation. I have seen these chills occur at variable times in the postoperative convalescence and for various bizarre and innocuous causes; I have seen a chill occur promptly after an enema; and several times this has occurred after a dressing; once this occurred in the presence of a considerable amount of retention. All of these were single chills. Repeated chills and high temperatures are usually associated with pyelphlebitis, as Dr. Colp says, almost invariably so. And I use the term "almost" because I remember one patient in whom, subsequent to operation, there were chills and fever and all the other signs of pyelphlebitis, but who, unfortunately for the diagnosis but fortunately for himself, proceeded thereafter to get well; one does not usually accept the diagnosis of pyelphlebitis when the patient recovers. Under such circumstances the presence of a lymphangitis must be seriously considered.

## FOREIGN BODIES IN THE INTESTINE\*

LOUIS CARP, M.D.

(Author's Abstract)

The literature of foreign bodies in the intestine is replete with interesting and unusual cases. Ingested foreign bodies, varying widely in number, size and character, may travel through the intestine, a

distensible tube of comparatively small diameter, causing repeated mechanical insults to the intestinal wall without producing symptoms or permanent tissue damage. The pathological physiology and the mechanical factors to explain these phenomena will be briefly considered later.

From 1915 to 1926 there have been admitted to the Presbyterian Hospital 54 cases of proven foreign body in the intestine. Many different types of foreign body were encountered and most of them were evacuated without untoward symptoms. From an analysis of these cases the following summary may be given:

1. The foreign bodies were swallowed accidentally or by those who knew no better.

2. The largest number (72 per cent) occurred among babies and children under ten years of age.

3. The cases were about equally divided between the sexes.

4. Dull objects were slightly preponderant.

5. Among sharp objects, pins were preponderant.

6. Most of the foreign bodies (85 per cent) were passed.

7. Of the sharp foreign bodies only two (15 per cent) perforated the gut.

8. The minority of the patients who pass foreign bodies have symptoms or signs.

9. It takes a sharp body a little longer to pass than a dull one.

The tonic, peristaltic and rhythmic segmental contractions of the intestine tend to overcome the anatomical bars to the progress of a foreign body. They are the duodenum, ileocecal region, lumen of the appendix, junction of cecum and ascending colon, and the flexures and haustrae of the large intestine, including the rectal ampulla and the crypts of Morgagni.

The presence of a foreign body in the intestine may be due to migration from a neighboring organ, cavity or extremity, to accidental or deliberate ingestion, or to introduction through the anus into the

\* Read in abstract.

rectum. Deliberate ingestion may result from an act of insanity, a dare, a habit or medicinal therapy. Accidental swallowing of foreign bodies is by far the most common. This occurs in careless and rapid eating or if a foreign body is placed in the mouth temporarily it may be swallowed through absent-mindedness or a sudden inspiratory effort.

Although almost any type of foreign body may gain access to the intestine, those most frequently found are metal, bone, fruit pits, glass, hair, wood and cloth. Deliberate ingestion, usually accomplished with less choking and pain than accidental ingestion, accounts for the remarkable size of some of these bodies.

What happens to the foreign body in the intestinal lumen and the reaction that may be produced in the intestinal wall constitute a most important aspect of this entire subject. Many are recovered in the same condition as before ingestion, but the intestinal juices may cause a metal object to break in two, or foreign bodies may be surrounded by some natural protective coat consisting of mucus, unabsorbed food or feces. Glass is usually rounded off by the digestive juices.

Although Nature's protection facilitates the passage of most foreign bodies, symptoms frequently develop from obstruction, traumatism or perforation of an organ. Thus we may find a peritonitis, peritoneal abscess, or fistulous communication between intestine and intestine, or between intestine and some other organ such as the bladder. Other foreign bodies that are thin and sharp may perforate the gut, producing few or no symptoms, and travel through the peritoneal cavity or along muscle planes, or into a large blood vessel. Such a procedure usually takes a long time. Many cases are operated upon for appendicitis, in which a foreign body in or near the appendix is found to be the etiological factor.

We have confirmed experimentally some of the observations made by Exner in 1902. The intestinal mucosa reacts to a light

prick or stroke by the formation of a temporary area of anemia at the point of contact, followed by a retraction of the mucosa which persists for from five to fifteen minutes. In a large series of experiments Exner further found that pointed foreign bodies are passed with heads isoperistaltic in a ratio of 7 to 3 to those passed with points isoperistaltic. This means that the intestine has a tendency to pass pointed foreign bodies blunt end forward.

Most foreign bodies in passing through the intestine produce no symptoms. When symptoms occur the diagnosis must be made on a careful history and a physical examination, followed by the various laboratory aids, especially the roentgen ray. Such symptoms may be summarized as:

1. A mild cramp when the body passes through the intestine naturally.
2. A cramp or pain in one spot when it passes through slowly.
3. Diarrhea and mucus or blood in the stool from irritation of the intestinal mucosa.
4. Intestinal obstruction.
5. Pain, tenderness and constitutional symptoms from inflammation and pressure necrosis.
6. Perforation.

*Treatment.* The prophylactic treatment is obvious: to eat carefully and to avoid placing foreign bodies in the mouth. The immediate course to be pursued following the ingestion of a foreign body is non-operative and expectant. The size and the nature of the foreign body, the condition of the intestine itself, and the possibility of its localization will decide the wisdom of a subsequent radical procedure. The potential harm from the foreign body is never to be discounted. The unexpected may occur at any time from an apparently innocent foreign body. Close observation and immediate operative therapy when the symptoms so warrant are of paramount importance. On the other hand, we have shown by statistics and by

experimental work that there is a natural tendency for the spontaneous passage of foreign bodies without untoward symptoms. To help Nature, two factors are essential: the prevention of intestinal hypermotility, and the ingestion of such material as might aid in the formation of a protective coat around the foreign body. The idea of hastening the exit of a foreign body by the use of a cathartic is, I think, a mistake. Powerful intestinal contractions diminish the caliber of the intestinal lumen and may prevent rather than enhance progress. Further, a powerful contraction may drive the foreign body into or through the intestinal wall. Bran, agar-agar, whips of cotton, pultaceous and stodgy food leaving a residue, such as oatmeal, vegetables, figs, raisins, etc., with the addition of a lubricant such as mineral oil would help to surround the foreign body with a protective coat. When present in the large intestine longer than expected, barium or oil enemas may be used. If symptoms are produced when a foreign body gets to the rectum it is better to remove it with the finger or through the proctoscope. Ambulatory treatment is not contraindicated, although rest is to be desired.

#### CONCLUSIONS

1. Most foreign bodies of the intestine are ingested accidentally and in the majority of cases are evacuated spontaneously regardless of their size, shape, material and number.

2. Trauma from intestinal foreign bodies is guarded against by the protective mechanism of the intestinal wall which produces concavities with muscular boundaries on the mucosal aspect at the points of contact (Exner). This causes an increase in diameter of the intestinal lumen which facilitates propulsion forward of the foreign body by peristalsis and movement of intestinal contents.

3. Foreign bodies, pointed at one end, have a tendency to pass through the

intestine with point antiperistaltic and to be evacuated blunt end forward. In this position the point is less likely to impede the progress of the foreign body through the intestinal canal and consequently foreign bodies with blunt end forward will be evacuated more quickly than those with point forward.

4. A foreign body may travel from the intestine into another organ or into the peritoneal cavity and from there into muscle planes, with few or no symptoms. When late symptoms occur they are referable to the other organ or tissue involved.

5. Conservative treatment of intestinal foreign bodies is indicated in the large majority of cases as shown by statistics and experimental work. Careful observation, rest, and food or any substance leaving a large intestinal residue may help the successful passage of a foreign body. Cathartics are to be interdicted.

6. Obstruction or acute perforation of the intestine or impaction of a foreign body in its wall demands operative therapy.

#### Discussion

DR. ROBERT T. MORRIS: Apropos Dr. Carp's case of a fishbone that travelled from the rectum to the bladder, I had a patient who swallowed a wire applicator and roentgen-ray studies were made of its progress. It remained perpendicular in the stomach, one end held in the esophagus. I at first advised against operation. After waiting one day and fearing it would perforate the stomach I operated. While receiving the ether the patient vomited and forced the wire through the stomach wall. When I opened the stomach the applicator was not there. The stomach wound was closed and roentgen-ray examination showed the wire free in the peritoneal cavity. There were no further symptoms for several days, the wire meantime changing position. It finally came to rest in the lower pelvis where it remained for two or three days. As it showed no tendency to move on I believed it best to operate and on doing so found it in the wall of the bladder buried in exudate. I believe it would





**FIFTEEN OPEN AND CLOSED SAFETY  
PINS REMOVED BY GASTROSTOMY  
THIRTEEN CLOSED SAFETY PINS  
REMOVED PER RECTUM  
LARGE NUMBER OF STRAIGHT PINS  
REMOVED BY APPENDECTOMY**

RICHARD LEWISOHN, M.D.

A female patient, nineteen years old, was admitted to the Neurological Service of the

their way into the appendix. This specimen is certainly very rare, indeed, probably unique.

The patient made an uneventful recovery. In spite of the fact that she was watched very closely, she managed to swallow thirteen safety pins (ten open and three closed) which I removed per rectum in February, 1914 (Fig. 3).

She was discharged April 2, 1914. She subsequently committed suicide by jumping out of a window.

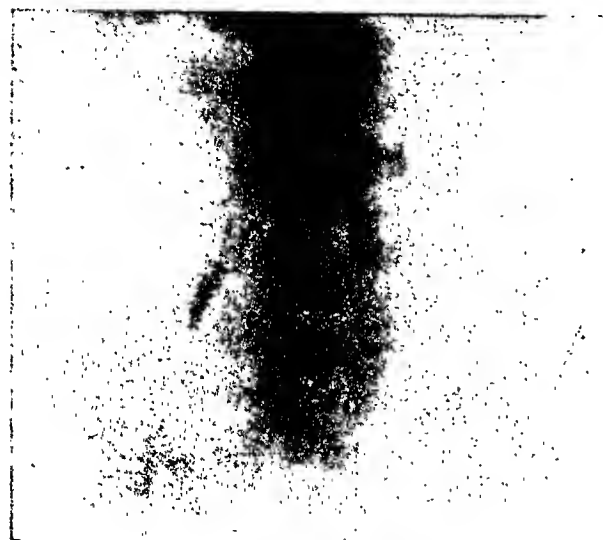


FIG. 1. Straight pins, lodged in appendix.

Beth Israel Hospital on November 13, 1913. She had suffered for two years from major hysteria with attacks of unconsciousness, lasting six to eight hours. These attacks occurred daily. During her stay in the hospital, she swallowed about fifteen open and closed safety pins, which were extracted by Dr. Silver through a gastrotomy opening.

The patient swallowed a large number of straight pins a few weeks later. These lodged in the appendix and were removed by Dr. Silver on January 31, 1914. (Figs. 1 and 2.)

It is certainly remarkable that these pins (numbering about twenty) were able to enter, head forward, into the narrow lumen of the appendix. It is even more remarkable that neither gangrene nor perforation followed the entrance of the pins into the appendix. Upon removal the appendix showed acute inflammation in spite of the fact that the pins must have been in it for a number of days before the appendectomy was performed. It is very probable that these pins passed the ileocecal junction at different periods; yet all of them found

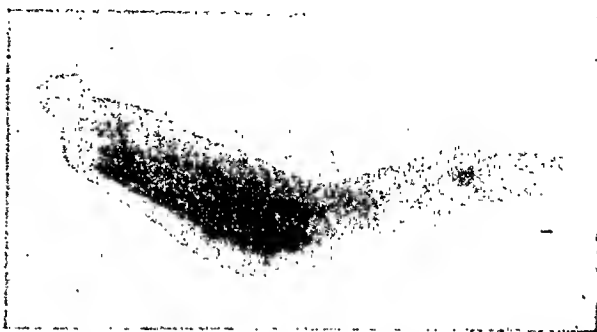


FIG. 2. Roentgenogram of appendix, containing about fifteen straight pins.

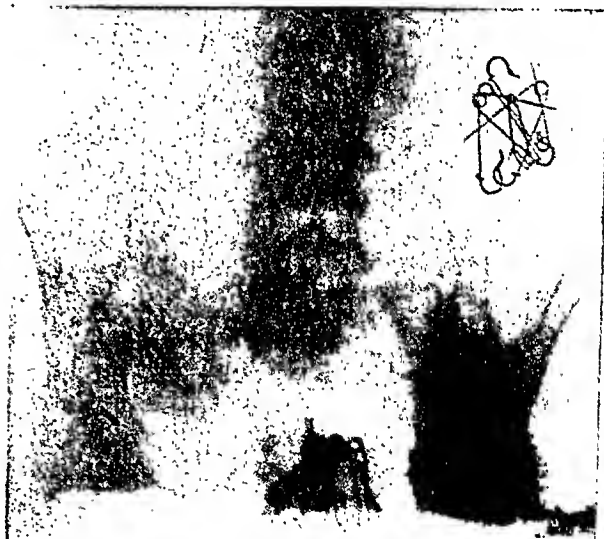


FIG. 3. Open and closed safety pins in colon and rectum.

## PRESENTATION OF CASES

### LIPOMA OF CECUM: INTUSSUSCEPTION

WILLIAM BARCLAY PARSONS, JR., M.D.

This patient, a widow aged forty-seven, presented herself in September, 1921, to the Presbyterian Hospital complaining of abdominal cramps with mucous diarrhea for three weeks. Her previous health had been excellent and there was nothing in her past history

apparently relative to her illness. The onset had been sudden, soon after a meal at which she had taken some suspicious meat. There never was either nausea or vomiting but she had much eructation of gas. During the three weeks there were apparently three distinct periods of five or six days each, during which the cramps and diarrhea would be marked for two or three days and then subside. Coincident with improvement her physician had given castor oil twice and a large dose of calomel the third time, in each instance the medication having served to start the cramps again. Her appetite remained good. She had four or five movements a day containing considerable mucus but never any blood.

Except for general obesity the only physical signs of importance were in the abdomen which was distinctly distended in its lower part where there seemed to be a large rounded mass that could be moved somewhat from side to side. There was dullness over the center of this mass and tympany in the flanks. No other masses could be made out and neither tenderness nor spasm could be elicited. On pelvic examination a small cervix could be made out rather high up but no masses and no tenderness. It was felt that the mass that was palpable was an ovarian cyst, which had served to lift the uterus up out of the pelvis, and that the diarrhea was probably a mild colitis. A roentgenogram of the colon showed a deformity considered to be due to spasm.

At operation an intussusception of the ileocecal region was found, the apex of the intussusciptens being a tumor arising in the mediocecal pouch which had passed through the ascending to nearly the middle of the transverse colon, pulling with it appendix and terminal ileum. The mass palpated before operation turned out to be omentum at least 5 cm. in thickness in its middle region. As soon as compression was applied beyond the apex of the intussusception spontaneous reduction began. This, however, was never completed as the mass had apparently passed through a constriction. The ileocecal region was incised and an end-to-side anastomosis done.

The patient made a very satisfactory recovery, beginning to pass gas on the first day. She was never distended and, aside from a thrombophlebitis of the internal saphenous vein, she made an excellent recovery. It is now slightly over five years since her operation.

She has a good appetite, regular bowel movements without catharsis, and a firm scar.

The diagnosis was not made in this case. The thick omentum made palpation of a mass impossible, and the absence of blood in the stools and the rather mild general picture were factors that prevented the diagnosis. The tumor was a lipoma.

Before the New York Surgical Society in April, 1926, Douglas showed a similar case and quoted Derrocque, who reported, in the *Journal de Chirurgie* in 1924, 105 cases of lipoma of the intestine. These were symptomless in 34 per cent of the small intestine cases but in only 9 per cent of the large bowel cases. Intussusception had occurred in 85 per cent of the 32 small bowel cases giving symptoms, and in 50 per cent of the colon cases giving symptoms. As with fibroma in the small bowel the pedunculated type lying within the bowel are of course far more apt to cause symptoms than the ones arising from the serosa and presenting on the outer surface of the tube.

### FIBROMA OF SMALL INTESTINE: INTUSSUSCEPTION

WILLIAM BARCLAY PARSONS, JR., M.D.

A trained nurse, aged sixty-six, came to the Presbyterian Hospital in May, 1926, complaining of abdominal cramps for four weeks. For the first week she had had cramp-like pains in the umbilical region coming in waves of short duration, without relation to meals usually, but occasionally following the taking of food. The attacks occurred by night as well as by day. After a week she became nauseated and began to vomit. This vomiting persisted for about a week and then it was absent for three or four days. For three or four days before admission the vomiting had begun again and was more frequent and more severe than previously, the pain being likewise far more severe. Her bowels had moved somewhat since onset. During the first week or so there was diarrhea, perhaps because she was taking magnesia regularly during that period. Up to the onset of the present illness she had always been constipated. There was no blood or mucus in the stools. During the present illness she had lost much weight and strength. There had been some loss of appetite but she had not eaten much through fear of pain and vomiting.

She was thin, emaciated and the lower abdomen was moderately distended. Visible

peristalsis was observed in the lower left quadrant on one or two occasions. No definite mass could be made out by abdomen but on rectal examination there was a slight sense of mass present. Gastrointestinal examination with a small barium meal showed nothing in the stomach. It showed dilated loops of small intestine in the left upper quadrant, with some horizontal fluid levels. At the twenty-four hour examination barium was present in practically the entire large intestine. Some was also seen in the lower jejunum or upper ileum and in the lower ileum loops. The former were rather markedly dilated, the latter appearing essentially normal. The examination disclosed evidence of an obstruction in the small intestine, the nature of which was not evident. One of the mechanical types of obstruction seemed to be the most logical diagnosis.

At operation, somewhere in the middle of the ileum was found an intussusception about 12 cm. in length. At the apex there was a solid tumor lying within the small intestine and arising from an area about 1 cm. square on the antemesenteric border. A small section of small intestine was incised and the bowel repaired by an end-to-end anastomosis. On section the tumor proved to be a simple fibroma of the intestine.

The patient made an excellent postoperative recovery and now after six months is in good condition with regular bowels, good appetite and fairly good strength.

In neither of these cases was the diagnosis made but the conditions are relatively rare ones and therefore it seemed worth while to present them, especially in connection with the subject of foreign bodies in the intestines.

### Discussion

DR. EDWIN BEER: Dr. Parsons' cases were quite interesting to me. I heard today of a very remarkable case. The patient was operated upon without diagnosis, but a tumor of the upper bowel was suspected and was found in the jejunum. It had started as a pedunculated tumor of the upper duodenum, had loosened up the duodenum and telescoped into the jejunum.

DR. EDWARD D. TRUESDELL: I was very much interested in Dr. Parsons' two cases. I think we rarely operate upon a case of intussusception in a child without wondering, in vain, what the explanation of the intussusception may be. I recently operated upon an

infant in whom the origin of the intussusception was a Meckel's diverticulum that had become invaginated into the lumen of the small bowel and this, acting as a foreign body, had given rise to an intussusception, apparently first of ileum into ileum, and then of ileum into the colon, an ileocolic type of intussusception.

### POSTOPERATIVE MECHANICAL OBSTRUCTION ON THE THIRTY-SECOND DAY

J. WILLIAM HINTON, M.D.

Female, aged twenty-two years, admitted to Bellevue Hospital, April 30, 1926. Family and previous histories essentially negative.

*Present Illness.* Acute abdominal pain for twenty-four hours, which began in the epigastric region and was associated with vomiting and constipation. After several hours it was localized in the right lower quadrant. Patient had taken cathartics for relief of the abdominal pain. She was two and one-half months pregnant.

*Physical Examination.* Patient acutely ill. Temperature 101°F., pulse 128. Marked distention of the entire abdomen. Great tenderness in both lower quadrants, more marked in the right. Definite rigidity of right rectus muscle. No masses felt. Tenderness greatest at McBurney's point. Leucocytes 7800; 89 per cent polymorphonuclear, 11 per cent transitional. Urine, negative.

*Preoperative Diagnosis.* Ruptured appendix with peritonitis.

*Operation.* Right rectus-splitting incision. Peritoneal cavity filled with free fluid; intestine markedly injected. Appendix retrocecal and perforated at the base. Stump was not inverted. One drain inserted to the stump of appendix, one along the lateral wall of the ascending colon, and one into the pelvis. Abdomen closed in layers, with No. 2 chromicized catgut. Retention silkworm-gut sutures.

*Pathological Report.* Acute suppurative appendicitis.

*Progress.* Patient's condition progressed satisfactorily with the exception of a slight septic temperature. No marked abdominal distention. Bowels moved regularly with the aid of enemas. Profuse purulent discharge from the wound. Drains removed on the tenth day and wound continued to discharge profusely. Spontaneous miscarriage on the fourteenth day. Out of bed on the twenty-first day.

Patient's condition remained satisfactory until the thirty-first postoperative day when she complained of some pain in the lower abdomen. She was nauseated but did not vomit. The following day she vomited a small amount of fluid, not fecal. Colonic irrigations were given with only slight fecal return. A few hours later definitely fecal vomiting and severe pain in the abdomen.

*Operation.* Abdomen again opened through a left rectus-splitting incision. On opening the peritoneum, small gut was found markedly distended. Inspecting previous laparotomy wound, a loop of intestine, presumably ileum, was found plastered against the peritoneum, causing complete obstruction. The gut was distended proximal to the point of obstruction and collapsed distal to the obstructing point. The intestine was freed from the peritoneum. Some other small adhesions were separated. Cigarette drain inserted to the pelvis; wound closed in layers.

*Progress.* Very satisfactory convalescence. Wound healed by primary union. Patient was discharged from the hospital on the eighteenth day following second laparotomy.

*Follow-up.* Patient weighed 92 lbs. on leaving the hospital. On November 22, she weighed 114 lbs. She has been free from symptoms and was doing house-work four weeks after leaving the hospital.

(No discussion)

## POSTOPERATIVE INTESTINAL OBSTRUCTION ON THE FIFTH DAY

J. WILLIAM HINTON, M.D.

Male, aged thirty years, admitted to New York Post-Graduate Hospital, July 2, 1926, with pain in the right side of the abdomen.

*Family History.* Irrelevant.

*Past History.* Typhoid fever at eight years of age. No other serious illness or operations.

*Present Illness.* Ten days before admission patient was seized with abdominal pain in the right side. No nausea or vomiting. The pain was severe enough to incapacitate from work. Bowels were constipated. He called his family physician, who kept him in bed with ice on abdomen, restricting food by mouth. He had some fever at the beginning, which subsided after a few days in bed. After a week in bed he was allowed up and his pain returned, and was aggravated by walking or exercise.

*Physical Examination.* Well-developed and

nourished man, apparently not critically ill. Temperature 99° F., pulse 80. Moderate tenderness and rigidity in the right lower quadrant. No definite muscle spasm detected. No tenderness over left lower quadrant or either of the upper quadrants. No masses felt. Rectal examination negative. Leucocytes 12,800, polymorphonuclear 90 per cent, lymphocytes 9 per cent. Urine negative.

*Preoperative Diagnosis.* Subsiding acute appendicitis.

*Operation.* Abdomen opened through a right rectus-splitting incision. The cecum was found adherent and difficult to deliver. Large retrocecal abscess. Appendix extended upwards and was difficult to deliver. It was gangrenous and perforated near the base. Appendectomy. The stump was ligated and cauterized, not inverted. One cigarette drain was inserted to the stump, one along the lateral wall of the ascending colon, and one into the pelvis.

*Pathological Report.* Acute gangrenous appendicitis.

*Progress.* Patient's condition was very satisfactory until the third postoperative day, when he became distended and it was very difficult to expel either gas or fecal matter by enema or colonic irrigations. Gastric lavage did not relieve the condition. No vomiting. The distention became more marked and the temperature ranged between 100° F. and 103° F. On the fifth day the condition seemed much worse. He vomited about 8 A. M., but the vomitus did not contain fecal matter. That afternoon he had definitely fecal vomiting. At 3 P. M. enterostomy was decided on, and was done immediately.

*Operation.* Under novocaine anesthesia, a left rectus-splitting incision was made and the first intestinal loop that presented was used for the enterostomy. One inversion suture was taken in the gut and trocar inserted inside of this suture a No. 18 French catheter inserted into intestine through trocar and trocar removed. One suture taken through the wall of gut and catheter. Intestine not sutured to peritoneum. Muscle and fascia sutured with No. 2 chromicized gut. Retention silkworm-gut suture above and below catheter.

*Progress.* For the first twelve hours there was no drainage through the enterostomy tube. Warm saline irrigations failed to bring away any fecal return. Twenty-four hours postoperative, the enterostomy tube began to drain.

The patient's condition showed slight improvement after the first twenty-four hours, but he vomited several times during this period. After forty-eight hours he was draining profusely through the enterostomy tube and enemas were effectual. After seventy-two hours distention was entirely relieved and he was passing fecal matter by rectum. Catheter came out on the fourth day and he continued to discharge fecal matter through the enterostomy. On the eighth day the opening had closed and he was having normal bowel movements by rectum. On the twelfth day following enterostomy he was discharged from the hospital in good condition.

*Follow-up.* Patient returned to work on August 21. Weight was 123 lbs. When he called at my office on November 22 his weight was 145 lbs. Bowels move once or twice daily, without cathartics.

(No discussion)

## POSTOPERATIVE PARALYTIC ILEUS ON THE SEVENTEENTH DAY

J. WILLIAM HINTON, M.D.

Male, aged thirteen and one-half years, admitted to Bellevue Hospital on August 8, 1926. Family and previous histories essentially negative.

*Present Illness.* Twenty-four hours previous to admission, patient had a sudden generalized abdominal pain, followed in about three hours by nausea and vomiting. A few hours later he had several loose bowel movements. He was unable to sleep and after ten hours the pain localized in the right lower quadrant. There was no difficulty in urinating. He was unable to retain anything by mouth. There had been no previous attacks of pain.

*Physical Examination.* Apparently acutely ill. Temperature 101°F., pulse 110. Marked tenderness in the right lower quadrant with some rigidity and slight muscle spasm. Slight tenderness in the left lower quadrant. No definite muscle spasm. Rectal examination negative. Leucocytes, 12,200, polymorphonuclear, 80 per cent, lymphocytes, 14 per cent, transitional 5 per cent. Urine negative.

*Preoperative Diagnosis.* Acute appendicitis. *Operation.* Abdomen opened through a right rectus-splitting incision. Cecum found high and difficult to deliver. Appendix acutely inflamed, with small perforation near its middle. No definite abscess, although consider-

able free fluid in abdomen. Appendix removed, stump ligated and cauterized, not inverted. One cigarette drain inserted to the stump and one in the pelvis.

*Progress.* Patient remained acutely ill following the operation, running a septic temperature of 99° F. to 103° F. Pulse from 120 to 130. No distention. Drains removed on the fifth day by mistake. On the twelfth postoperative day, blood culture was negative. Patient discharged profuse pus from the abdominal wound. He complained of pain in abdomen at intervals. He did not vomit but bowels were somewhat loose, two or three movements a day. On the thirteenth day rectal examination failed to reveal any masses. Patient getting 1000 c.c. of 5 per cent glucose by hypodermoclysis, daily. On the seventeenth day his condition remained unchanged and he continued to run septic temperature.

Rectal examination was negative. Abdomen not distended and the patient was vomiting about once in every forty-eight hours. It was the consensus of opinion that he probably had a pelvic abscess.

*Operation.* Left rectus incision. There was no evidence of a pelvic abscess. The small intestine was found distended, about twice its normal size. In the region of the cecum there was a serosanguinous discharge but no definite abscess. No point of obstruction could be found. No collapsed gut seen. Drain inserted in the region of the cecum and one in the pelvis. Abdomen closed in layers.

*Progress.* Patient's condition remained critical after the laparotomy and he was given two blood transfusions of 250 c.c. each, besides daily infusions of glucose solution during the first seventy-two hours. On the fourth day following the second operation he developed a spontaneous fecal fistula and then began to show slight improvement. One week later his condition had markedly improved. He had marked excoriation of skin around the fecal fistula. His condition continued to improve and he was discharged from the hospital on the twenty-ninth day following second operation, at which time the fecal fistula had closed spontaneously and the right rectus incision had entirely healed.

*Follow-up.* Patient's weight was 63½ lbs. on leaving the hospital and on November 22 it was 81 lbs. His best weight is 90 lbs. He was free from complaints when seen on November 22.

(No discussion)

# PROCEEDINGS OF SOCIETIES

## THE AMERICAN ASSOCIATION FOR THE STUDY OF GOITER

THE fourth annual meeting of The American Association for the Study of Goiter was held at Philadelphia, January 31 and February 1, when nearly a hundred members and visitors were in attendance. As in the past, the interest in this meeting was such as to attract physicians from all sections of this country and from Canada. Leaders in all phases of goiter study were present and the discussions of an attractive program proved of great interest and value.

Among the papers that evoked considerable discussion were those of Dr. O. H. Kimball, on Endemic Goiter and Public Health; Dr. Andre Crotti, who dealt with the infection theory of the etiology of endemic goiter; Dr. James Means, who gave a splendid review of the development of our knowledge of the thyroid gland; Dr. Arnold Jackson on Iodine Hyperthyroidism; Dr. Allen Graham on The Use of Iodine in Toxic Goiter.

Dr. Kimball, who with Marine and Lenhart has so strongly supported the theory of iodine deficiency as a cause of endemic goiter, presented a thorough review of the results of their work to date. Considerable new statistical data were presented in support of this view, and the question of iodized salt as it is now being used by the Michigan health authorities received considerable comment. Through his studies of the goiter situation in West Virginia, Kimball has concluded that the incidence of goiter has greatly increased there since 1900, due to a new refining process that practically eliminated iodine from the salt. Chemical analyses of samples of the salt formerly used show the same percentage of iodine as is now advised for iodized salt.

Dr. Crotti presented some interesting slides showing organisms that he had

isolated from goiters and discussed the results of the past twelve years of research on this problem. He has never supported the iodine deficiency theory as a cause of goiter in itself, but believes that infection is the most important factor and that possibly the iodine is rendered inert through the action of an organism.

The papers by Drs. Jackson and Graham on iodine and goiter were the subjects of an interesting discussion by Dr. Henry Plummer. He felt that while iodine is undoubtedly a factor in inducing iodine hyperthyroidism in adenomatous goiter, as maintained by Jackson, this condition should not be classified as an entity distinct from toxic adenoma. He could not support the view upheld by Graham, Marine, Kimball and others that the various types of toxic goiter should not be separately classified but considered merely as a difference in degree of toxicity.

Nineteen papers were on the program of the afternoon sessions. The morning sessions were devoted to clinics held under the auspices of the University of Pennsylvania Medical School. Surgical clinics were given by Dr. C. K. Frazier, and medical aspects were considered by Drs. Pepper, Kern, Wolferth, Stengel, Rose and Hammett. Drs. Chevalier Jackson and Gabriel Tucker discussed laryngeal examination in patients with goiter. Interesting observations from roentgenological studies were presented by Dr. Pancoast.

The Society was honored by the presence of Dr. C. E. Sajous, Professor of Endocrinology at the University of Pennsylvania, whose long scientific career and valuable contributions to this subject are so well known. On a motion by Dr. Bram the members extended a vote of congratulation to Dr. Sajous, since the meeting date coincided with the twenty-fifth



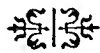
anniversary of the publication of his book on endocrinology, the first of its kind in this country.

Much of the success of the meeting was due to the efforts of Dr. Kerwin Kinard of Kansas City, who arranged the program, and of the Philadelphia members, especially Drs. Wayne Babcock and W. Blair Mosser. Dr. Emil Goetsch, President of the Society, was unfortunately unable to be present on account of illness.

The next meeting of the Society will be at Denver, and will probably be held in

June, 1928, so as to enable the members to make a pleasure trip as well. Officers elected for the coming year are: President, Lewis M. Van Meter, Denver; Vice-President, Arnold Jackson, Madison, Wis.; Secretary, F. B. Dorsey, Keokuk, Iowa; Corresponding Secretary, Kerwin Kinard, Kansas City, Mo.

THE AMERICAN JOURNAL OF SURGERY was selected as the official organ of the Society for the publication of its papers, which will appear in early issues.



## SURGICAL SUGGESTIONS

A RUBBER finger cot used to retain a dressing causes the skin to become sodden. This can be largely obviated by cutting minute holes in the cot for ventilation.

NOTHING gives so much relief to the pain of a burn as cold water. Immerse the burned part in it, or cover with cold wet compresses, until the pain ceases, usually about an hour. Then apply whatever treatment has been decided upon.

THE danger of squeezing a boil is grossly exaggerated. A furuncle will continue to suppurate as long as it contains a slough. Digital expression of the slough usually effects a prompt cure and without an incision.

FURUNCULOSIS often yields promptly to reduction of carbohydrates in the diet, even when there is no glycosuria.

## COLONIC DIVERTICULITIS

It is within comparatively recent years that we have acquired a recognition of the significance of intestinal diverticula and of the varied symptomatology of diverticulitis. There is, of course, much difference between the mere presence of a diverticulum or diverticula and the affection that arises with inflammation therein; and it would be interesting to know what percentage of individuals with diverticulosis escape attacks of diverticulitis.

In spite of the literature that has accumulated on the subject, diverticulitis is so much less common than cholelithiasis, appendicitis, ulcer, urinary calculus, pelvic disease and neoplasms, that it is often forgotten or overlooked when one is confronted with a painful abdominal affection. Yet it should be the first thought in subacute left-sided abdominal complaint—especially of pain in the left lower quadrant, since colonic diverticulitis is most common in the sigmoid. Two very interesting articles on this subject are presented in this issue of the JOURNAL. Mailer reports two unusual cases, in which tuberculosis and diverticulitis coexisted in the sigmoid colon. Ballin's article, based on a considerable personal experience, presents very clearly the pathology, the varying symptomatology, the diagnosis and the treatment of colonic diverticulitis. It leaves but little to add from the clinical side. As he points out, adhesion to and perforation into the bladder is more apt to take place in diverticulitis than in carcinoma of the sigmoid, and intestinal obstruction is much less apt to occur. We are familiar with reduction in the size of a carcinomatous mass after colostomy, but the practical disappearance of such a mass means, of course, as Ballin emphasizes, that the supposed carcinoma was entirely inflammatory. Actinomycosis is another of the

unusual affections of the sigmoid that, like diverticulitis, is sometimes mistaken for a neoplasm.

Colonic diverticulitis may go on to the formation of a larger or smaller pericolic abscess, or it may subside and leave the individual subject to further attacks. Formidable as is resection of the sigmoid, it deserves serious consideration in the presence of a diverticulitis, because of its dangerous possibilities. Among these, though probably an uncommon complication, is abscess of the liver. Indeed, an hepatic abscess not otherwise explained may well suggest an inquiry into the possible presence of a sigmoid diverticulitis, active or quiescent.

Certain individuals have a syncopal attack when an enema is administered. Some of them, we have reason to believe, have sigmoid diverticulosis.—W. M. B.

## PARAFFINOMA

McWilliams' brief article in this issue of the JOURNAL very tersely tells of the evils and the dangers of subcutaneous paraffin injections, and the manner in which the masses they produce are to be dealt with surgically, to the extent that they can be dealt with. Upon reflection, it seems hard to believe that there could have been seriously accepted for the relief of depressions in the face the injection of a hardening foreign body into tissues that should be soft, supple, elastic, mobile. Indeed, so far as we know, the procedure (which Gersuny introduced in 1900 and which had more or less vogue for a few years thereafter) has been pretty much abandoned by surgeons and, in this country, at least, is practiced almost exclusively by quack "beauty specialists" more bold than conscientious. In the course of time (often not a long time) the paraffin becomes surrounded by a mass of scar

tissue far more disfiguring, and certainly more uncomfortable, than the depression for the cure of which the injection was undertaken. Very often, however, the bad results of such injections are not only remote but immediate. What happens, not infrequently, is this: a vain or morbid individual, male or female, distressed by some small scar depression, abnormal dimple or wrinkle in the face, permits a "beauty specialist" to inject paraffin beneath it; a drop or two too much is used and the depression becomes a slight protrusion on one side of the face; to balance this the victim is persuaded to have the opposite side of the face filled out correspondingly by a second paraffin injection; on this occasion a little escapes into another spot and thus the side last treated has two projections and the first side only one; so the beautifier again attempts to balance the features by a third injection, this time again on the first side; and so the process goes on until the poor victim who goes to the "specialist" with an insignificant depressed scar on one cheek finally leaves him with both sides of his face as lumpy as a basket of apples, and as hard. When the paraffinomas are discrete something can be done, sometimes, by their excision *en masse*; and if this can be accomplished through the mouth so much the better. However, the relief by extirpation is very incomplete for the connective tissue formation is usually quite extensive. Indeed, one sometimes sees the fair features of some foolish woman converted into a contracted, tense, dense mask, a loathsome, bluish, lumpy mass of scar tissue in which the jaws are fixed and only the lips and eyelids retain some measure of mobility! For relief from such a condition the only recourse is suicide; and in suicide has more than one victim of the "beauty specialist" sought escape. Of the applications of paraffin injection that for saddle-nose is at once the most nearly acceptable and the most dangerous. Whatever excuse there may have been for the employment of these injections twenty years ago, there

is none now that we have acquired experience in transplanting living tissues. Saddle-nose is correctible by the insertion of a bone graft, and a depression in the soft parts, if large enough to warrant it, by an inlay of fat.

The pathogenesis of paraffinoma is not without interest. The hydrocarbon mass becomes surrounded by connective tissue and is also divided into compartments by connective strands which, it has been generally assumed, grow into and through the paraffin from the enveloping scar tissue. In a series of articles published in the JOURNAL over twenty years ago, and reprinted in book form,<sup>1</sup> Luekett and Horn, of New York, showed that this assumption was not valid, that these presumed-to-be ingrown strands of connective tissue are present from the moment of injection, at which time the liquid paraffin "runs along in the direction of least resistance, forcing, tearing and stretching its way between the layers, bundles or even single fibers. . . running from one alveolar space to another, encircling, surrounding and encompassing these layers, bundles, fibers or cells and even blood vessels." This they demonstrated by sections made immediately after injections into animals and into cadavers. They found also that solid paraffin masses inserted subcutaneously in animals showed later no permeation by connective tissue or blood vessels, whether left as a single mass or broken into fragments after implantation.—W. M. B.

### CLARENCE A. McWILLIAMS

Dr. Clarence McWilliams of New York, one of the Editorial Board of the JOURNAL, died last month of pneumonia at the age of fifty-six. He was a member of the New York Surgical Society and of the American and International Surgical Associations. He was surgeon to the New York Skin and Cancer Hospital and had been on the

<sup>1</sup>Luekett, W., and Horn, F. I. Paraffin in Surgery. N. Y., 1907.

staff of the Presbyterian Hospital for several years. His contributions to surgical literature were many, important, and on a wide variety of topics. Recently he had been devoting his talents largely to plastics, on which also he had written several admirable articles, and had especially made a study of whole thickness skin grafts.

He took part in the Spanish-American War and during the World War he served in the A. E. F. At the outset of the Allied counter-offensive in the early summer of 1918, when the most important consideration was the concentration and mobilization of men and guns, the surgeons at the front, overborne with their work, could spare little of their precious time for records; and the wounded were hurried back from Evacua-

tion to Base hospital with only scanty, and often faulty, medical memoranda. During that time a convoy of five hundred wounded American soldiers reached a large Base Hospital in France. Most of them had been operated upon but a couple of days before; some had been rushed back without operation. Few brought with them more than a fragmentary surgical memorandum, and some of them none at all. But to the blouse of one of these wounded men were pinned two rough pieces of paper on which were written in pencil, and in evident haste, a description of a long and complicated operation, as logical and as complete in essential details as one might find in times of peace. It was signed "Clarence McWilliams."  
W. M. B.



## SURGICAL SUGGESTIONS

IF suppuration persists or a sinus develops after operation for appendicitis, consider the possibility of actinomycosis.

TO evacuate blood or pus through a finger-nail or toe-nail, incise it transversely. A longitudinal incision is apt to leave a split nail.

IF A sebaceous cyst does not shell out easily, or if it presents an unusual appearance on section, have it examined for epitheliomatous degeneration.

NEVER bandage or strap two skin surfaces together, as is so often done with the Sayre dressing for fractured clavicle. Always put some gauze between. When applying adhesive plaster to the abdomen after a laparotomy, put a little gauze in the umbilicus.

# BOOK REVIEWS

GOITER AND OTHER DISEASES OF THE THYROID GLAND. By Arnold S. Jackson, M.D., Jackson Clinic, Madison, Wis. 8vo. Price, \$10. Pp. 417; 151 illus. N. Y. Paul B. Hoeber, Inc., 1926.

The great interest and attention that have been aroused on the subject of goiter within the past few years have created a demand for a book on this topic. Medical literature has been full of discussions of this important problem, but there has been little attempt to correlate the subject matter and provide a common medium for the specialist and the general practitioner. Dr. Jackson's book fills this want.

It contains twenty-one chapters, giving a brief review of the anatomy, embryology, histology, physiology and pathological chemistry of the thyroid in the opening section. The relation of the thyroid to the other ductless glands is fully discussed. Brief chapters are devoted to a historical review and to the geographical distribution of goiter. The various theories concerning the etiology of goiter are then presented. Undoubtedly the most valuable part of the text concerns the classification, symptomatology and diagnosis. It is this phase of the subject that has caused more confusion and failure of treatment by the practitioner than almost any other in the realm of medicine. The classification is so simple and the points of differential diagnosis are so clear as to enable one easily to distinguish between the various types of goiter. For the first time a chart is presented, showing graphically all the points of differential diagnosis. A new clinical entity has been added by establishing iodine hyperthyroidism as a distinct and separate form of toxic goiter. A series of 50 cases is given, showing how hyperthyroidism was induced by the indiscriminate use of iodine.

Separate chapters are devoted to malignancy and thyroiditis, myxedema and cretinism, pathology, the basal metabolic rate, the heart, preoperative and postoperative care, local anesthesia, surgery, operative complications, mortality, etc. The medical phase is not neglected, and a chapter is devoted to the aff-

important subject of prevention and the cooperation of the internist.

The chapter dealing with the use of iodine is of great importance, in that a full discussion of Lugol's solution in the treatment of exophthalmic goiter is presented.

Fully a hundred pages are devoted to surgery and the various points in technique are clearly demonstrated either by drawings or by photographs of the operation.

The book is not intended to be an encyclopedia but a text correlating the latest views on this subject and presenting much that has not yet appeared.

The literature has been exhaustively reviewed, and a vast new fund of information relating to goiter has been added in a clear and concise manner.

Although there are 400 pages, the chapters are short and interesting, so that, as one critic has said, "it is a sort of psychological proposition that leads one to read a lot more than one intended to in the beginning. It does away with much of the deadly scientific dullness so often found in medical literature and makes reading a recreation and a delight."

The book is beautifully printed and bound and profusely illustrated and it contains a good index.

Arnold Jackson is a graduate of the Mayo Foundation, and his book not only represents the splendid work of such men as Charles H. Mayo, Plummer, Judd, MacCarthy, Pemberton, and others, but he also presents the results of several years' subsequent experience with a large series of cases at the Jackson Clinic. Besides, Jackson has previously contributed several articles to the literature of the thyroid, including reports on the use of iodine in exophthalmic goiter, pregnancy and goiter, iodine hyperthyroidism, etc.

To the approval of the book by authorities on goiter of national and international reputation, who have proclaimed it the most valuable textbook on that subject yet produced, the reviewer takes pleasure in adding his recommendation of the work from the viewpoint of the general surgeon. It should be read by every one interested in the question of goiter.

WILLY MEYER.

**PRACTICAL SURGERY OF THE JOSEPH PRICE HOSPITAL.** By James William Kennedy, M.D., F.A.C.S., Surgeon to the Joseph Price Hosp., Phila.; 8vo; Pp. 861; 129 plates. Price, \$10.00. Phila. F. A. Davis Co., 1926.

The late Dr. Joseph Price must have been an interesting and forceful man, if we are permitted to judge solely by the character of his work and the type of men he gathered about him. This is well shown in the recently published volume by Dr. James William Kennedy, former assistant and at present surgeon to the hospital established by Dr. Price. The work entitled "Practical Surgery" is really devoted to a very large extent to the surgical problems and procedures that the operating gynecologist encounters. The problems are considered in detail, and thereafter a minute description of the various steps in the operation, illustrated by whole page drawings, is given. Following the lead of his preceptor, Kennedy makes a strong plea for the more general use of vaginal as compared with abdominal hysterectomy.

The work is sincere. It presents a definite point of view in gynecological matters. It is forceful. It is well printed and excellently illustrated. But, unbelievable as it may seem, it is inaccurate and in places almost illiterate in its diction. It seems difficult to understand how the proof reader could have permitted such glaring errors in English to pass. But, in spite of even these shortcomings, the book draws the reader on with promise of something interesting and valuable, and he is not disappointed.

**PNEUMOCONIOSIS (SILICOSIS).** A Roentgenological Study with Notes on Pathology. By Henry K. Pancoast, M.D., Prof. of Roentgenology; and Eugene P. Pendergrass, M.D., Associate in Roentgenology, Univ. of Penna. 8vo. Pp. 202; 23 illus. Price, \$4.00. N. Y. Paul B. Hoeber, Inc., 1926.

This small volume on the roentgen-ray aspect of pneumoconiosis should be of value to every internist and roentgenologist. It is a concise and authoritative study of the result of the inhalation of the various dusts, with especial emphasis on the pathology. In the introduction

the authors make this significant statement: "Roentgenological interpretations of any morbid process in the lungs must be based upon a thorough knowledge of the anatomy and histology of the lungs and the pathological processes peculiar to the infecting or etiological agent. One must acquire the habit of thinking in terms of pathology and rendering deductions upon a pathological basis, because he is interpreting the shadows of disease processes." The authors have made an extensive study of the literature and give a good bibliography. The material is well arranged and the reproduction of the roentgen plates is excellent.

**EMMO SCHLESINGERS' RÖNTGENDIAGNOSTIK DER MAGEN- UND DARMKRANKHEITEN.** Mit Einschluss der Erkrankungen der Speiseröhre und Gallenblase. Ed. 3. Edited by Dr. Ernst Raehwalsky, Spezialarzt für Magen- und Darmkrankheiten, Berlin. Mit einem Originalbeitrag über die Erkrankungen der Speiseröhre, by the late Dr. Emmo Schlesinger, Berlin. 8vo. Pp. 495, 528 illus. and 32 pl. Berlin: Urban & Schwarzenberg, 1926.

In this third edition of what was originally the work of the late Emmo Schlesinger, the roentgenological aspect of gastrointestinal diseases is fully discussed and minutely described. The present author, Raehwalsky, has brought the subject up to date, included many case reports and added chapters on esophageal lesions and on cholecystography.

The chapter on Diseases of the Esophagus is especially interesting. There are no omissions. Every possibility or probability is delineated and properly illustrated in black and white schematic line drawings. There are also numerous half-tone illustrations of roentgenograms. We regard line drawings as much more instructive.

There is little new to speak of in gastrointestinal lesions, other than the personal observations of the authors. For the student and beginner, however, the descriptions of the physiological and pathological processes as revealed by the roentgen ray will be very instructive.



# PROGRESS IN SURGERY

*Selections from Recent Literature*

STOPFORD, JOHN S. B., Manchester, Eng. The causation of the increased intracranial pressure associated with tumors within the cranium. *Brit. M. J.*, Dec. 25, 1926, No. 3442, p. 1207.

It is shown that the great vein of Galen is situated in such a position that it is pressed against the splenium of the corpus callosum indirectly or directly by tumors occupying sites which are known to give rise most constantly to increased intracranial pressure.

Such compression is not so likely in the case of tumors occupying situations known to cause less frequently increased intracranial pressure.

Experimental and clinical evidence has been submitted by Dandy and others that occlusion of the great vein of Galen leads to internal hydrocephalus from overproduction of cerebrospinal fluid.

It is suggested that moderate compression without complete occlusion of the vein is likely to give rise to increased intracranial pressure, accompanied by slight or negligible dilatation of the ventricles.

If the views put forward are correct, the increased pressure caused by intracranial tumors is due to an excessive production of cerebrospinal fluid, with which absorption cannot keep pace.

SCHUGT, HENRY P., New York. Tuberculosis of the larynx. Treatment by surgical intervention in the superior and inferior laryngeal (recurrent) nerve: A report based on seventy-nine cases. *Arch. Otolaryngol.*, Dec., 1926, iv, 479.

Results in 15 cases of therapeutic paralysis of the recurrent nerve may be summarized: improved, 9 cases; unimproved, 3 cases; worse, 2 cases; insufficient treatment and observation, 1 case.

This method of treatment, which has been in use for only a few years, appears destined to play an important rôle in the treatment of tuberculosis of the larynx as an adjunct to the other methods of treatment. Laryngologists who prefer more conservative methods of treatment are likely to use this method, as are those who may have justifiable doubts as to the efficacy of operative intervention, such as

curettage and cauterization, which may be useful in certain cases and harmful in others.

The therapeutic paralysis of the recurrent nerve is especially beneficial in unilateral cases which have not advanced too far and in which the pulmonary condition is relatively favorable, i.e., in the fibrotic forms.

AUSTIN, MAYNARD A., Anderson. Some neglected factors in the goiter problem. *J. Indiana M. A.*, Dec. 15, 1926, xix, 478.

Thyroid dystrophies are both medical and surgical. Medical cases may become surgical emergencies at any time. But whether medical or surgical they are both conditions of long standing, brought about by disadvantages of civilized living and habits, producing emotional and nervous changes which will be permanently improved only after a long period of observation. The prognosis should always be favorable if the environment of the patients is such as to allow less strenuous living and more friends and friendships of the kind they crave. In spite of their peculiarities, tactful management may bring out submerged personalities, often amounting to little less than genius, which we may some day find has its source in the thyroid hormones.

WALTERS, WALTMAN, Rochester, Minn. The suggested use of thyroid extract to reduce the incidence of postoperative embolism. *Minnesota Med.*, Jan., 1927, x, 25.

Two years ago, after a consideration of the effect of early movement of the patient in bed in increasing the rate of blood flow, it seemed that not only might the rate of circulation be increased in this manner but that the metabolism of the body might be increased by thyroid extract with resulting increase in peristalsis, increasing depth of respiration, acceleration of blood flow, and indeed, speeding up of all the functions of the body. Thyroid extract was given by mouth in 2 grain doses three times a day for seven days, beginning on the third or fourth day after operation and continuing until the patient was out of bed. No deleterious effect was noted. The patients were urged to move themselves about in bed, especially to turn from side to side. In the period,



between October, 1924, and October, 1926, these movements and thyroid extract were employed in 1745 cases of major operations. No patient less than seventy years of age died from pulmonary embolism. Further clinical support to the value of increased metabolism in the prevention of thrombosis and embolism is lent by Plummer's observation that in cases of severe cardiac decompensation coincident to hyperfunctioning thyroids thrombosis or embolism rarely, if ever, occurs.

STROUSE, SOLOMON, and BINSWANGER, HERBERT F., Chicago. The symptom complex resembling hyperthyroidism without increased metabolism. *J. Am. M. Ass.*, Jan. 15, 1927, lxxxviii, 161.

Strouse and Binswanger analyze 32 cases that presented the symptom complex closely resembling so-called hyperthyroidism without changes in the basal metabolic rate. This complex has been known for some time under various names, but except for one report made during the course of this study, these patients have not been treated with iodine. The authors believe the results of such treatment justify the opinion that the symptoms and signs of this complex are associated with iodine deficiency. Iodine medication relieved the symptoms but did not affect the basal metabolic rate. The suggestion is offered that the condition may be one of disturbed thyroid function. Probably it does not represent a true primary clinical entity, but it may be a secondary functional manifestation of disease processes elsewhere in the body.

ANDREWS, EDMUND, and KAMPMEIER, OTTO F., Chicago. Swellings of the male breast. *Surg., Gynec. & Obst.*, Jan., 1927, xlv, 30.

Contrary to the usual teaching, benign swellings of the male breast are much more common than malignant ones.

Adenofibroma and gynecomastia are the result of chronic infection.

The male breast is far from rudimentary, containing even in old age an elaborate system of patent ducts opening onto the skin, which are evidently quite liable to infection from without.

PIRIE, HOWARD A., Montreal. Diseases of the chest demonstrated by lipiodol. *Am. J. Roentgenol. & Rad. Therap.*, Dec., 1926, xvi, 553.

Roentgen examination after the injection of lipiodol gives a pathognomonic picture in

bronchiectasis; 50 c.c. have been injected with the patient in supine position with no bad effect. The after-effects of thoracoplasty can best be studied by the use of lipiodol. In skilled hands bronchoscopic injection of lipiodol is the best method.

Indications for use of lipiodol are: Suspected bronchiectasis; suspected tuberculosis when tubercle bacilli cannot be found in sputum; after thoracoplasty, when the patient is not doing well; for demarcation of the diaphragm when it is invisible in suspected subdiaphragmatic abscess; for exclusion of bronchiectasis before performing thoracoplasty; for localization of a known abscess; for stenosis; for demonstration of a tuberculous cavity; for bronchopleural fistula; for foreign bodies, and for the negative diagnosis of bronchiectasis.

BALLON, HARRY C., Montreal. The value of lipiodol in the diagnosis and treatment of abscess of the lung. *Surg., Gynec. & Obst.*, Jan., 1927, xlv, 1.

Ballon classifies lung abscess as:

- i. Solitary.
  - a. With fluid level. This type of abscess is demonstrable by ordinary roentgen ray.
  - b. Large bronchiectatic abscess, acute or chronic. This type of abscess may be aspirated and lipiodol may be injected. They may often be bilateral and are at times associated with some other phase of bronchiectasis.
  - c. Associated with bronchiectasis, chronic. This is of the narrow neck type in which expectoration is but overflow. They show no fluid level and on injection the abscess area casts no shadow.
- ii. Multiple.
  - a. Multiple lung abscess, chronic, which may be associated with bronchiectasis.
- iii. Secondary. Those due to tumor and foreign body.
- iv. Tuberculous. This type may be associated with bronchiectasis, acute or chronic.

Metastatic lung abscess and cyst degeneration are not considered in this classification.

Ballon reviews 94 cases of abscess of the lung of which 25 per cent occurred following operations about the mouth and throat. Errors in diagnosis based on the so-called typical history are illustrated.

The relative infrequency of a demonstrable cavity with fluid level by the ordinary roentgenogram is noted. Moreover in many instances

it gave an ill-defined anatomical localization of the site of disease and even a false impression of the extent of disease which clinical examination often failed to correct.

The use of lipiodol by the bronchoscopic method, when combined with a definite routine examination, is of undoubted value. No reactions from the use of this agent in this form of lung suppuration have been noted.

Shorter hospitalization and better results will be obtained when the surrounding parenchyma and bronchial architecture are completely defined, particularly in relation to the left chest behind the heart shadow, to the lung area below the dome of the diaphragm, and to ill-defined diaphragmatic shadows.

Healthy tissue on the non-affected as well as on the affected side should be demonstrated before extensive operative procedure is commenced. The condition of the upper and lower respiratory tracts is of importance in obscure cases.

LAWSON, JOHN D., Woodland, Calif. The use of iodized oil in the demonstration of empyema cavities and fistulous tracts. *Surg., Gynec. & Obst.*, Jan., 1927, xlv, 11.

The injection of iodized oil (e.g. lipiodol) into various sinuses and cavities for roentgenography is a valuable means of studying their extent and relations, as, for example, in empyema sinuses, ischio-rectal tracts, abdominal fistulae, tuberculous sinuses, bone sinuses, etc. Beck's paste, various types of suspensions of barium and bismuth have marked disadvantages; the various iodide and bromide solutions are very irritating and their use must be restricted to selected cases.

It is not necessary in all cases to use the full strength solution. The size, depth and location of the area injected governs this particular procedure. In chest work above the diaphragm if a 20 per cent content of iodine is present, the shadow is relatively as dense as that produced by a more concentrated solution. For that reason it has been the custom to dilute the iodized oil with pure olive oil down to 20 per cent iodine content. This in no way interferes with the solution. However, if it is allowed to stand for any length of time, is exposed to the air, or is sterilized in the autoclave, a portion of the iodine is precipitated and the solution is rendered unfit for use. Hence the diluting is done at the time of injection and any remainder discarded. In the injection of all cavities aseptic

technique must, of course, be used. The procedure is absolutely painless.

The shadow may remain for weeks or even months. Symptoms of iodism have never appeared in any patients of this series although as much as 50 gms. of iodine have been injected at one time.

WHIPPLE, ALLEN O., New York. More recent studies upon the etiology of postoperative pneumonitis. *N. York State J. M.*, Dec. 1, 1926, xxvi, 967.

The studies of several investigators have pointed out three fairly well-defined pathological processes in the production of postoperative pulmonary complications: aspiration of infected secretions into the bronchial tree during a general anesthesia with the disappearance of the cough reflex; pulmonary infection due to the emboli, sterile or septic, coming from a venous thrombus; and a variable degree of atelectasis. Whipple cites some recent experiments. The great majority of so-called postoperative pneumonias are associated with one or the other of these factors, and are lobular in type. These lesions differ from the ordinary lobar pneumonias in their onset, course and termination and are for this reason frequently overlooked under the term "postoperative reaction." But they nevertheless delay the immediate recovery and in abdominal cases, because of the associated cough, jeopardize the wound healing. There are in addition a certain number of clear-cut lobar pneumonias of the type seen in medical practice due to pneumococcus I, II, or III, and the pneumonias associated with septicemia and pyemia.

That an upper respiratory infection, recent or concurrent, is a real factor is demonstrated by the fact that although in 1924 the incidence at the Presbyterian Hospital was 2 per cent and in 1925, 1.4 per cent, the incidence of pneumonitis in patients giving the history of a very recent or concurrent cold was 15 per cent in both years. The great majority of these patients came to the hospital with conditions wherein operation was not a matter of choice. Whipple again emphasizes the importance of eliminating exposure of patients to the factors that so strongly predispose to upper respiratory infections. This applies as much to the poorly compensated cardiac or the nephritic case on the medical ward as it does to the surgical patient. These factors are draughts, to which they are entirely unaccustomed, chilling during examina-

tions, preoperative preparations and postoperative treatments, etc.

PALMER, WALTER LINCOLN, Chicago. The mechanism of pain in gastric and in duodenal ulcer. *Arch. Int. Med.*, Dec. 15, 1926, xxxviii, 694.

Palmer concludes:

1. Typical ulcer distress can be initiated in patients under suitable conditions by: (a) the reinjection of the gruel obtained at the time of distress, (b) solutions of hydrochloric acid of similar concentrations (and therefore entirely physiological) or by stronger solutions, (c) solutions of sulphuric and acetic acids and of sodium hydroxide.

2. Such distress is not produced in normal stomachs by similar injections.

3. Distress so produced is relieved by neutralization of the chemical irritant, or by partial removal of the irritant and neutralization of the remainder.

4. Hydrochloric acid is the irritant normally present in the gastric content which constitutes an adequate stimulus to the pain-producing mechanism of a sensitive peptic ulcer.

5. The distress of gastric carcinoma can be similarly induced at times.

6. The distress typical of the other abdominal conditions studied has not been induced by acid injections up to the present time, or, if already present, it has not been altered by them.

7. No evidence has been obtained of hyperesthesia of the gastric mucous membrane, or of pain as the result of hyperchlorhydria with an intact gastric and duodenal mucosa.

DICKEY, LLOYD B., San Francisco. Duodenal ulcers in children. *Am. J. Dis. Child.*, Dec., 1926, xxxii, 872.

The diagnosis of chronic peptic ulcer in children is rarely made except at operation or at necropsy. Of the 25 cases now reported in the literature, 5 were diagnosed at necropsy, 11 at operation and 9 clinically.

Three cases of what apparently are duodenal ulcers in children are reported by Dickey. All gave roentgenological evidence pointing to this lesion, and all were remarkably relieved on a diet for patients with ulcer.

If a careful investigation of chronic abdominal complaints in children is made, which includes roentgenological studies, it is probable

that the incidence of chronic peptic ulcer will be found to be greater than has been believed, and that these patients may be easily relieved of rather distressing symptoms.

BÁRSONY, THEODOR, and SZEMÖ, GEORG, Budapest. The treatment of gastric and duodenal ulcers by means of intravenous injections of 10 per cent sodium chloride solution. (*Die Behandlung der Magen- und Duodenalgeschwüre mittels intravenöser Injektionen von 10% iger Kochsalzlösung*). *Med. Klin.*, Nov. 5, 1926, xxii, No. 45.

In the course of treating arthritic patients with injections of a 10 per cent solution of sodium chloride, the authors observed that certain of them who complained of pyrosis were relieved of their symptoms. Since October, 1925, they have given these injections to a series of 25 patients definitely known to be suffering from either a gastric or duodenal ulcer. In 14 cases there was complete subsidence of symptoms, while in the rest there was improvement by means of alkalies. The authors have observed, however, that within one and one-half years practically all of the symptoms recurred. They claim, therefore, merely a palliative value for the treatment. In patients suffering from tuberculosis, where the evil results of a focal reaction are to be avoided and consequently where protein therapy is contraindicated, this treatment may be employed.

The treatment consists of a series of 10 to 15 injections of 10 c.c. of a 10 per cent solution of sodium chloride intravenously. The patient is put on a meat-free diet and no alkali or other medication is given.

LAHEY, FRANK H., and JORDAN, SARA M., Boston. When to operate in cases of peptic ulcer. *N. York State J. M.*, Jan. 15, 1927, xxvii, 60.

In Lahey's clinic, where in the past three years careful medical management with neutralization by the Sippy method has been carried out, in association with the Surgical Department, and an effort is made to follow up all patients for ten years, results of medical management have so far been satisfactory enough, so that it is a routine procedure to submit the new case, unless it is an acute perforation, to medical attempt to heal the ulcer. It is not unusual for a referred case to give a history of the unsuccessful employment

of previous medical treatments and to come prepared for surgical treatment, only to be submitted again to a more accurate medical management with relief of symptoms. Only in cases of gastrojejunal ulcers does Lahey hesitate to recommend medical management because of its less satisfactory results, and this fact adds further grounds for preliminary caution in relation to the employment of gastroenterostomy.

Lahey operates:

1. In cases of perforated ulcer.
2. In unrelievable obstruction.
3. In cases of recurrent hemorrhage.
4. In all cases where there is a reasonable ground for suspicion of carcinoma.
5. In cases of failure with medical management.

If gastroenterostomy has a mortality of 2 or 3 per cent and an incidence of gastrojejunal ulcer of between 3 and 30 per cent, if, for instance, it is 10 per cent, or even 7 to 8 per cent, and if in addition to this there are cases in which after gastroenterostomy jejunal ulcer does not occur, but relief from pain or bleeding in the original ulcer is not obtained, then there are few of us who would wish to have this operation performed upon us when any other form of treatment or relief is available.

Partial gastrectomy removes and quite positively controls acidity and eliminates later possibility of hemorrhage, perforation and malignant degeneration. If we could be certain that the ulcer were a pathological entity, we could more ardently advocate this procedure. Its disadvantages are: (1) the possibility of recurrence of ulcer even with low or absent acid (such recurrences have occurred in Lahey's experience, and have been personally reported to him in the clinics of Mayo, Schumacher and Moynihan); (2) the possible danger of permanent anacidity with especial relation to the non-bactericidal gastric secretion and pernicious anemia; (3) the high mortality.

In justice to the patient and to the surgeon, mortality rates must be regrouped under several different headings. The less urgently indicated the partial gastrectomy is, as in ulcers on the anterior wall of the duodenum and gastric ulcers on the lesser curvature close to the pylorus, the easier it is to do and the lower its mortality; but when this operation is applied to the old eroding ulcers which have involved the pancreas and must be cut away with marked oozing, leaving a duodenal stump

difficult to close satisfactorily, or to ulcers high on the lesser curvature, or to the gastrojejunal or jejunal ulcer with resection of a portion of the jejunal wall, the mortality rate undoubtedly rises.

Especially in gastrojejunal ulcer should the mortality rate of partial gastrectomy be known, since the surgeon who employs gastroenterostomy must have in mind the possible occurrence of gastrojejunal ulcer and this possible secondary operative mortality. It is greatly to be desired, therefore, that mortality rates be regrouped:

(1) for the high gastric ulcers; (2) for the eroding posterior wall ulcers with marked retroperitoneal induration; (3) for the gastrojejunal ulcer, and (4) for the simple anterior wall duodenal ulcer with a free and mobile duodenum and the mobile lesser curvature ulcer close to the pylorus.

Jejunostomy, even though unsatisfactory in principle, in that the lesion is not removed and the causative factors probably still remain, must have a place in the surgical treatment of high gastric ulcers and gastrojejunal and jejunal ulcers in patients who obviously will not stand subtotal gastric resection.

STANTON, E. M., Schenectady. The stoneless gall bladder. A study of postoperative end-results. *J. Am. M. Ass.*, Dec. 25, 1926, lxxxvii, 2160.

The many large series of gall-bladder operations reported show high percentages of cases in which stones are not found, stones being found in approximately 65 to 70 per cent of cases, while 30 to 35 per cent are classified as cholecystitis without stones. In 282 gall-bladder operations that Stanton performed, stones were present in 216, or 77 per cent, and absent in 66, or 23 per cent. After reviewing the histories of these cases, he feels that the apparent, partial elimination of noncalculous cases has been the result of a rather conservative attitude toward gall-bladder patients with histories showing the lesser grades of morbidities. The group without gallstones must contain all cases in which operation was done under a mistaken diagnosis, and even though these patients recover from the operation and remain well thereafter, they must be segregated and considered by themselves. Viewed in the light of subsequent events and additional diagnostic data obtained since the date of operation, 12

patients operated on for gall-bladder disease are now definitely known to have been operated on under a mistaken diagnosis. This is 18 per cent, or 1 in 5, of the stoneless cases; but as regards the total gall-bladder operations, it represents only 1 known error in diagnosis in each 23 gall-bladder operations. In this group of known errors, there are 4 heart cases; 2 cases of acute pericarditis; 1 case of angina pectoris, and 1 case of paroxysmal tachycardia. In view of the great frequency with which cardiac disease may somewhat simulate gall-bladder symptoms, and the fact that many true gall-stone cases demand operation irrespective of coexisting heart trouble, it is interesting to find only 1 case of the angina type of heart trouble. Operation in the 1 case of paroxysmal tachycardia was based on a misleading history. The diagnosis was perfectly clear with the next attack of cardiac trouble. The 2 heart cases that proved most confusing and embarrassing were 2 cases of acute pericarditis. Stanton missed both of these diagnoses absolutely, although both patients subsequently had typical attacks of acute pericarditis with effusion. Three patients after operation were found to be suffering from hysteria and not gall-bladder disease. Two patients, uncured by their gall-bladder operations, subsequently developed cancer of the pancreas. One patient had syphilis of the liver which was provisionally recognized at operation. She was promptly cured by anti-syphilitic treatment. One patient was cured by treating a general abdominal ptosis. Another was subsequently relieved by cutting a dense band of adhesions which caused intermittent partial intestinal obstruction. When the known errors in diagnosis are eliminated, there is still a group of 54 cases, classed as cases of cholecystitis without stones. In 17, the operations have either been of too recent date to determine the end-result, or the patients were lost from observation soon after the operation. This leaves 38 cases with end-results known over periods of from one year to seventeen years after operation. Twelve out of the 38 were apparently definitely and permanently cured by their operations. Ten of these operations were cholecystectomies, and two were cholecystostomies. In this group the apparent pathological changes have varied from one gall bladder described as "apparently normal but removed because of the very definite clinical symptoms" to acute purulent cholecystitis. As a matter of

fact, the conditions described fail to show any pathological factors common to the group. One noteworthy fact is that the term "strawberry gall bladder" was not used in describing any case in this group. All actual objective data that Stanton has studied point to the conclusion that in the present state of our knowledge the one reliable indication of gall bladder disease of a type yielding to surgical intervention is the presence of well-defined attacks of gall-bladder colic. If the surgeon is definitely certain of his ground relative to the clinical history of biliary colic, he can proceed to remove the gall bladder irrespective of demonstrable gall-bladder disease. Just so far as the clinical picture of true biliary colics becomes doubtful, or the clinical picture shades over into ill-defined digestive disturbances of the general type that many surgeons have been wont to call the symptoms of the precalculeous stage of cholecystitis, do the end-results of operative treatment begin to fail. As in chronic appendicitis, it seems highly probable that the indications for operation must be based and justified almost wholly on the symptomatology, and that little reliance can be placed on the pathologist's report until such time as pathologists learn to recognize a pathological condition corresponding to the symptomatology.

JUDD, E. STARR, MENTZER, STANLEY H., and PAREHILL, EDITH, Rochester, Minn. A bacteriologic study of gall bladders removed at operation. *Am. J. M. Sc.*, Jan., 1927, clxxiii, 16.

Fourteen per cent of cultures of the bile from the gall bladder were positive. Cultures from normal or thickened dark bile were practically always negative; the positive cultures were from light-colored bile, usually grainy, purulent or blood-tinged. Concentrated bile pigment is an inhibitor to bacterial growth. Cultures of gallstones were positive in 31 per cent. In spite of the fact that the gall bladders were usually removed during a quiescent interval, often when there was no gross evidence of infection or inflammation, 49 per cent of the cultures of the wall of the gall bladder were positive. The organism most often found in the wall was a streptococcus, usually green-producing on blood agar.

Culture of the bile does not yield reliable data on the presence or absence of infection in the gall bladder. Only 14 per cent of the cultures of

bile were positive. The streptococcus found produced lesions of the gall bladder or infection of the bile in 75 per cent of animals injected.

MIERS, E. M. A helpful adjunct in the treatment of appendicitis. *Weekly Bull. Jackson Co. Med. Soc., Mo., Dec. 25, 1926, xx, 487.*

Miers emphasizes the importance of drainage of the intestine in suppurative appendicitis.

In the past 31 cases of suppurative appendicitis the following procedure was adopted as a routine: abdomen opened; appendix removed and a catheter inserted into the bowel through the stump of the appendix and brought out through the abdomen, thus immediately establishing an artificial opening or a handmade fistula to allow the accumulated flatus and liquid bowel content to escape. A catheter as large as the stump of the appendix will admit is threaded into the bowel, and fastened by two catgut sutures, and a purse-string suture about the stump, which is inverted in much the same manner as one would invert a gall-bladder drainage tube. In a few days protective adhesions wall off this stump and tube from the general peritoneal cavity. The tube usually comes away on the sixth or seventh day and the fistula closes promptly. The shortest time no fecal drainage appeared in the dressings was three days after the tube came out, and the longest time was twenty-seven days. The youngest patient operated on by this method was two years old and the oldest fifty-six years old. Two died.

This treatment in no way interferes with any other drainage or with general treatment. There was a surprisingly small amount of nausea and vomiting in any of these cases.

McFADDEN, GEORGE D. F., Belfast. Torsion of the meso-appendix associated with gangrene of the appendix. *Brit. M. J., Dec. 25, 1926, No. 3442, 1223.*

In this case the appendix, surrounded by omentum, was found lying close to the anterior abdominal wall. When the omentum was separated the appendix rotated itself in a clockwise direction through 180°. It was then found that the mesentery of the appendix had still a half-twist. The appendix itself, about 5 inches in length, was a necrotic mass from its tip to within a quarter of an inch of its base.

POLAK, JOHN OSBORN, Brooklyn, N. Y. How the pathology of fibroid tumors of the uterus will determine the selection of radium or operation in their treatment. *Am. J. Obst. & Gynec., Dec., 1926, xii, 781.*

Radium may be used for the control of hemorrhage in tumors, *within the confines of the uterus*, if the tumor is not larger than a three months' pregnancy, and is without adnexal growth or parametrial or peritoneal lesions.

Before subjecting any woman to roentgen-ray or radium therapy, she should be examined under anesthesia to determine the exact relation and location of the tumor mass or masses, and a diagnostic curettage should be made to exclude malignancy. All scrapings should be submitted to a pathologist.

The following types of tumor demand operation:

1. Tumors larger than a three months' pregnancy.
2. Rapidly growing tumors which suggest progressive changes.
3. Tumors producing pressure symptoms.
4. Tumors associated with pelvic pain.
5. Pedunculated tumors, in which radium only increases the necrosis.
6. Tumors with adnexal disease.
7. Tumors with associated secondary anemia (cachectic appearance) in which the uterine hemorrhage has not been sufficient to account for the degree of anemia.
8. Tumors in young women.
9. Multiple submucous tumors distorting the uterine cavity (radium in these cases is likely to produce pyometra), and finally, in cases where the tumor mass cannot be definitely differentiated, and in women who fear radium.

All of these cases require either myomectomy or hysterectomy.

STEWART, CLARA, London, and YOUNG, MATTHEW, Glasgow. Cancer of the uterus. A statistical study; with special reference to the results of operation. *Lancet, Dec. 18, 1926, cxi, 1258.*

This paper contains an analysis of the post-operative histories and of certain features such as age distribution, duration of symptoms and parity in 176 hospital patients with cancer of the cervix uteri and 38 patients with cancer of the corpus uteri. The main points derived from the inquiry are:



1. The results of radical operation in cancer of the cervix must be considered very favorable notwithstanding the relatively high operative mortality. The extent of the gain from this form of treatment may be gauged from the fact that in the group so treated the number of survivors at the beginning of the fourth year is nearly four times, and at the beginning of the sixth year after operation fully nine times the numbers in the comparable groups in a long series of cases permitted to run their course without treatment.

2. In corpus cancer treated by radical methods the end-results are more favorable than those in cancer of the cervix treated radically.

3. The average reputed duration of symptoms prior to operation in the patients with cancer of the cervix who were treated radically diverges very slightly from that in the patients who were considered unsuitable for operation.

4. The mean age at operation of the patients with cancer of the corpus uteri has been shown to be about five years higher than that of the patients with cancer of the cervix.

5. The proportion of nulliparae among the patients with cancer of the cervix uteri is 10.8 per cent. This is significantly lower than the proportion amongst those with cancer of the corpus uteri, namely, 40.5 per cent.

GOLDSTEIN, ALBERT E., Baltimore. Bilateral ligation of the vas deferens in prostatectomy. *J. Urology*, Jan., 1927, xvii, 25.

Fifty unselected cases were taken, varying in age from forty-one to seventy-five years, with an average of 64.5 years. The type of prostate that was dealt with was: 19 benign, 2 carcinomatous and 4 fibrous operated upon without ligation of the vas in comparison with 20 benign, 3 carcinomatous and 2 fibrous prostates where the vas deferens was ligated and sectioned.

Goldstein draws the following conclusions:

1. Prostatectomy without ligation and partial resection of the vas deferens results in a high percentage of complicated epididymitis (20 per cent), irrespective of the type of prostate dealt with or the method of its removal.

2. Bilateral ligation and partial resection of the vas deferens in prostatectomy reduces the complication of epididymitis to a minimum (4 per cent in this series).

3. Ligation and resection of the vas should be done early, even before prostatectomy, to avoid an epididymitis from frequent catheterization.

4. A section of 0.5 cm. to 1 cm. of the vas should always be removed to avoid anastomosis.

5. The operation should be performed in the scrotum so that if a vasitis does occur it can be reached easily.

6. Ligation of the vas deferens has no effect on the sexual powers.

STEVENS, WILLIAM E., San Francisco. Diagnosis of renal tuberculosis. *J. Am. M. Ass.*, Jan. 8, 1927, lxxviii, 71.

Stevens says that involvement of the kidneys occurs more frequently in the presence of active pulmonary tuberculosis than is generally appreciated. The presence of tubercle bacilli in smears of the bladder or kidney urine, or a positive guinea-pig test does not necessarily indicate renal involvement, as these organisms may occasionally be excreted by a normal kidney. Tuberculosis of the epididymis, prostate or seminal vesicles, primary so far as the genitourinary tract is concerned, is also often responsible for tubercle bacilli in the bladder urine. The very frequent association of genital and renal tuberculosis in the male, however, should be remembered. Tuberculosis of the female genitalia, on the other hand, is seldom associated with tuberculosis of the kidneys. Guinea-pig inoculation is not by any means infallible. In some cases, the guinea-pig tests have been negative but the smears positive. Tubercle bacilli were demonstrated at some time in 83 per cent of the specimens of urine from kidneys that Stevens found to be tuberculous at operation. The subcutaneous injection of tuberculin is occasionally of diagnostic value, but only from a positive standpoint. A rise in temperature, accompanied by a focal reaction such as increased pain in the kidney region, more frequent urination and more pus and tubercle bacilli in the urine, is significant. Information obtained by this procedure is also often of value when there is a question as to involvement of the opposite kidney. The roentgenographic observations in renal tuberculosis are positive in a much larger number of cases than is generally appreciated, and this procedure should be more frequently employed in the diagnosis of renal tuberculosis. Tuberculosis of the kidneys occurs more frequently in children than is indicated by most of the statistics appearing in the literature, and modern urological diagnostic procedures, such as cystoscopy, ureteral catheterization, functional kidney tests and pyeloureterography, are frequently indicated



in infants and children as well as in adults. Renal tuberculosis is uncommon as a complication of pregnancy, although it is probably often overlooked.

BROWN, DAMON A., Madison, Wis. Ureterocele. *J. Urology*, Nov., 1926, xvi, No. 5.

The author believes that ureterocele is due to a functional disturbance of urinary peristalsis in the lower part of the ureter. This may be due to adnexal, seminal or prostatic infection. The atony of the lower end of the ureter which results from pelvic infection plus the presence of a small ureteral orifice are the etiological factors entering into the formation of ureterocele. Pain, intermittent hematuria, irritability of the bladder and dysuria are the only symptoms. There is no pathognomonic sign except the cystoscopic appearance of the bladder. Of the many methods which have been suggested for the cure of this condition, the author prefers fulguration. The cyst-like protuberance of the ureteral orifice is fulgurated and no other treatment is instituted. One case is reported with complete relief following this method of treatment.

BUMPUS, HERMAN C. Ureteral meatotomy for the removal of stones from the ureter. *J. Urology*, Nov., 1926, xvi, No. 5.

Because of the difficulty of removing by open operation ureteral calculi impacted at the point of narrowing of the ureter as it passes into the wall of the bladder, Bumpus has devised a small scissors which may be attached to a filiform catheter and so guided into the ureteral orifice. The upper blade of the scissors is double edged and as the scissors are opened and withdrawn, the narrowed ureteral passage is incised. Thereupon, the author passes a number of catheters into the ureter and the stone is surrounded. The catheters are then twisted and withdrawn with the stone in the basket-like network formed by the catheters. To prevent obstruction of the ureter as a result of the operative trauma, the catheter is reinserted to provide drainage for twenty-four to forty-eight hours. This maneuver is usually successful but if not it should be repeated several times before proceeding to any open operation.

HENNESSEY, RUSSELL A., Memphis, Tenn. Leukoplakia of the bladder. *J. Am. M. Ass.*, Jan. 15, 1927, lxxxviii, 146.

Hennessey reports 1 case and analyzes 79 cases already recorded. In his case, the vesical

leucoplakia was associated with an unusual chronic inflammatory process (possibly pre-leucoplakie) involving both kidney pelves; hence Hennessey believes with others that chronic inflammations, irritations and calculi are important factors in the production of leucoplakia. Leucoplakia involving the urinary organs is most commonly found in the bladder. The lesion is more commonly found in the male in the ratio of approximately 3 to 1. Pathological observations indicate a pre-cancerous tendency in the area involved by the leucoplakia. Treatment has been variable and uncertain. Fulguration of vesical lesions is thought to be beneficial.

CURTH, W., Berlin. Roentgen therapy of buboes. (*Roentgenbestrahlungen von Bubonen.*) *Med. Klin.*, Oct. 22, 1926, xxii, No. 43.

The author reports on 60 cases of severe unilateral and bilateral buboes. Whereas under the usual treatment an average of thirty-three days was required for the cure of buboes, the author has been able to bring about complete healing even in the most severe cases within eighteen days. Similarly to its action in the treatment of furuncles and sweat gland infections, the roentgen ray seems to cause a disappearance of all pain within several hours and a rapid restitution to normal. The dose used varied between  $\frac{1}{5}$  and  $\frac{1}{4}$  H.E.D.

HAUSSLING, FRANCIS REYNOLDS, Newark. Painful shoulder. *S. Clinics N. America*, Dec., 1926, vi, 1503.

Painful shoulder in a large percentage of cases is accompanied by a deposit of lime salts in the tendon of the supraspinatus, a bursitis, or a combination of the two. The deposits of lime salts have a tendency to spontaneous disappearance, and with them the symptoms. Lime salts may appear simultaneously in both shoulders, accompanied by acute symptoms on one side and as a chance finding on the other. The calcareous deposits may be found at a considerable distance from the bursa and the tendon of the supraspinatus.

The deep injection of quinine and urea hydrochloride has been found effective in many of the so-called neuritides and myalgia. It has been most effective in cases of subdeltoid bursitis. The method of using the drug is as follows: At the point of greatest tenderness an injection of 30 minims of a 4 per cent solution of quinine and urea hydrochloride is given into

the muscle, a 2 inch 23 gauge needle being plunged to the bone and then withdrawn  $\frac{1}{4}$  to  $\frac{1}{2}$  inch. This is repeated every twenty-four hours until the pain is markedly relieved. The injection is made slowly. It may be painless or it may cause a burning sensation as far distant as the fingers. One per cent or 2 per cent solutions are not efficient. The intervals are then lengthened. The author has seen one or two injections promptly relieve the pain, while in other cases the first few injections markedly increased it. If persisted in, the treatment has always relieved the condition. Early active motion is urged, but no other treatment should be combined with the injections.

MITCHELL, A. B., Belfast. Dislocation of outer end of clavicle. *Brit. M. J.*, Dec. 11, 1926, No. 3440, 1097.

The deformity is easily reduced but difficult to keep reduced. Partial recurrence always follows the ordinary method of treatment.

The operation Mitchell now employs is very simple and very efficient. Once it has been done the patient can discard all dressings in eight to ten days, and resume work in fourteen days. Two patients were playing football in two months. The procedure is as follows:

1. A curved incision with convexity behind is made from the tip of the acromion to the middle of the posterior border of the clavicle.

2. The flap thus outlined is reflected forward, exposing the acromio-clavicular joints.

3. The interarticular cartilage is removed, and the ends of the clavicle and acromion process are freshened.

4. Two holes are drilled vertically through the end of the acromion, and also through the outer end of the clavicle.

5. A carefully sterilized strong silk ligature is passed through the clavicle, so that the free ends both project below and the loop is across the top.

6. The free ends are then drawn through the acromion from below upwards. This is best done by the aid of a loop of fine wire.

7. The ligature is now tightened and tied on the upper surface of the acromion. The effect of this is to pull the clavicle first downwards and then outwards, and to hold it firmly apposed to the acromion.

8. The periosteum around the edges of the new joint is sutured by fine chromicized catgut.

Mitchell discarded catgut in favor of silk on

account of the greater tensile strength and durability of the latter.

LIGHT, ARTHUR B., Philadelphia. The treatment of sprained ankles. *Therap. Gaz.*, Dec. 15, 1926, 1, 844.

The first step in the treatment of the sprain is to prevent, as much as possible, hemorrhage and effusion. This is accomplished by a firm bandage and cold applications. The bandage must be very firm, even to the point of pain. The leg should be elevated as much as possible to remove the hydrostatic pressure of the blood in the adjacent vessels. Cold applications in the form of wet towels are better than ice.

The firm bandage, cold applications, and elevation should be continued for about two hours. By this time the danger of further bleeding is stopped. The bandage is now removed, but again applied, making as much pressure as is compatible with comfort. It should not be painful. The leg is kept elevated for a period of twenty-four hours. The joint is roentgen-rayed to exclude fracture.

At the end of twenty-four hours, if there is no fracture, very gentle massage is given for a few minutes. The firm but non-painful bandage is retained, and the patient is instructed to walk slowly in a straight line. Just as long as he moves in the direction mentioned the ligaments are not under tension. With the assumption of the upright position, the effect of gravity on the blood again manifests itself in the damaged capillaries and there is an immediate tendency to swell. Hence the firm bandage. The Gibney boot at this period is of no use, as the patient will be very careful not to put any stress on the torn ligament. The bandage gives much more comfort. This increase in the tendency to effusion results in immediate pain.

After the patient has walked several steps and has been assured that the pain resulting therefrom will not do any damage, he will as a rule continue walking for some time. Finally, however, the effusion becomes so great that he is forced to stop. At this point the leg is again elevated and the pain rapidly disappears.

On the third day the period of massage is lengthened. Care must be taken to make it painless. On the third day hot applications for a half-hour twice a day are indicated, during which the limb must be elevated.

After the application of heat, gentle massage is given. Each day the individual is kept on his

feet sufficiently long to give the muscles their active exercise.

At the beginning of the fifth day he is made to run. The Gibney boot is now applied to prevent any abnormal movements.

FRANCISCO, C. B., Kansas City, Mo. Non-tuberculous hips in children simulating tuberculosis. *J. Missouri M. A.*, Nov., 1926, xxiii, 385.

Early diagnosis cannot be made definitely in cases of hip joint affections in children around ten years of age, but the absence of local and constitutional symptoms should suggest that the condition is not the result of disease.

Frequent roentgenograms are necessary in obscure cases. To mistake a non-tuberculous hip for a tuberculous subjects the child to a long period of unnecessary treatment.

Francisco describes cases of atypical Legg-Calvé-Perthes osteochondritis deformans coxae juvenilis. The etiological factor is the same, he says, as in the typical cases, which are now considered as developmental, resulting from some mechanical cause rather than from infection.

KEY, ALBERT J., St. Louis. The treatment of tuberculosis of the hip. *J. Missouri M. A.*, Nov., 1926, xxiii, 388.

The best result obtainable in tuberculosis of the hip is a firm bony ankylosis of the joint with the extremity in a good functional position.

In young children the treatment must be conservative.

With our present methods a certain amount of destruction of the joint must be expected to occur while the patient is under treatment.

In children over ten years of age and in adults, ankylosis should be attempted by operation, but before the arthrodesis is performed the patient should be built up by heliotherapy and diet, and the hip should be put in the position in which it is desired to obtain ankylosis.

Key describes a technique for performing an arthrodesis by the aid of osteoperiosteal grafts. It is not an extra-articular arthrodesis, however, the joint being opened by a Smith-Peterson approach, the cartilages removed, the bone surfaces refitted and the synovial lining excised.

WREDEN, R. R., Leningrad. Osteoplastic support of the spine in Pott's disease. *Ann. Surg.*, Jan., 1927, lxxxv, 35.

The author describes two operative methods of treatment which, in addition to immobilizing the affected section of the vertebral column, also support it, and which are found practically possible when the disease is located in the lower section of the vertebral column, i.e., in the lumbar and the last two dorsal vertebrae.

The method of transverse support may be applied in cases of an affection of both the fourth and fifth lumbar vertebrae or of either of them when, owing to their sagging, the spinous process of the fourth lumbar vertebra is situated below the line connecting the uppermost points of the cristae iliacae. Under a musculo-aponeurotic tunnel a rafter cut from the tibia is inserted from one iliac crest to the other.

The method of oblique support is applied in cases of an affection of the last two dorsal or the first three lumbar vertebrae and is performed by creating a trestle consisting of two long osseous transplants and fixing the lower ends of the latter in the cristae iliacae. The upper ends of the trestle are fixed in a crosswise manner beneath the process of the sound vertebra which is situated above the diseased section of the spine.

After the operation is completed the patient is kept on his back for six weeks. By the end of the second week he is allowed to rest for an hour or two daily on his abdomen with a hard pillow placed under his chest. After six weeks he is gradually trained to sit and seven weeks after the operation he begins to walk, having no need of any kind of corset.

A support of the spine by means of an orthopedic corset in these instances is even contra-indicated; for owing to the effect of the load of the trunk the osseous rafter grows and consolidates more rapidly whereas the erectores trunci placed over it appear to be a vis a tergo securing a reclination which is most important under the circumstances.

This method has been applied in only 10 cases.

KIRSCHNER, M. Königsberg. The correction of bony deformities through splitting of the bone. (*Der Ausgleich knöcherner Verbildungen durch Aufsplitterung des Knochens.*) *Med. Klin.*, Nov. 26, 1926, xxii, 1836.

Following the suggestion made in a previous communication, the author has operated on

about 100 cases of bony deformities subsequent to badly healed fractures, rachitis, or old osteomyelitis. He has had uniformly good results. The procedure consists in splitting the involved bone longitudinally in several different planes. This is carried out with the aid of a tourniquet and as far as possible without interrupting the continuity of the periosteum. The bone ends are interdigitated and a cast is applied. After the application of the cast, the bone is manipulated into proper position and the cast is permitted to harden. At the end of fourteen days, the cast is again removed to permit the further correction of any existing bone deformity.

The author believes that in this technique, there is less likelihood of non-union than by those in which the periosteum is freely incised. There is no danger of fat embolus as his cases demonstrate. Because of the extensive splitting of the bone there is marked tendency toward formation of a firm bony callus.

SCHAFER, ALEXANDER J., and ROTHMAN, PHILLIP E., Baltimore. The treatment of erysipelas with blood transfusion. *Am. J. Dis. Child.* Jan., 1927, xxxiii, 116.

Concerning the treatment of erysipelas by transfusion, it is sometimes maintained that this result, as well as the critical drop in scarlet fever following the injection of Doehe's or Dick's serum, is merely a manifestation of non-specific protein shock. This explanation seems hardly tenable in face of the fact that two of the patients received very large doses of antistreptococcal serum, intraperitoneally, intramuscularly and intravenously, with no effect, whereas transfusion shortly afterward was followed in both cases by immediate defervescence. It seems much more probable that a varying degree of immunity to Streptococcus erysipelas is acquired within the first few years of life as a result of infections of the upper respiratory tract in which this organism takes part. This hypothesis would explain the almost uniform fatality of the infection at and shortly after birth, and the rapid decline of the mortality curve with advancing age. The fact that a certain small percentage of adults die of erysipelas should explain why adult serum from all donors is not equally efficacious. Results with erysipelas serum from convalescent patients speak for this explanation. It has been consistently noted that in the successfully treated patients, the margin continues to spread for from twelve to twenty-four hours

following the treatment, after which the whole lesion fades rapidly, just as the diphtheritic membrane continues to grow for the same length of time before it finally disappears after antitoxin.

A series of 101 cases of erysipelas in infants and in children is reported. Nineteen of these were treated by the intravenous transfusion of whole citrated blood. The mortality in the treated group is distinctly lower than that in the control group.

## SUPPLEMENTARY ABSTRACTS ON ROENTGENOGRAPHY AND RADIUM THERAPY

ABRAMOWITSCH, F. M., and TICHOMIROV, S. A. On the introduction of the contrast material (lipiodol) into the bronchi. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, January, 1926, xxxiv, 22-25.

The employment of lipiodol for the diagnosis of such conditions as bronchiectasis and pulmonary abscess is without danger to the patient. Contraindications to its use are the existence of kidney disease, and poor general condition of the patient. The shadow-producing properties of lipiodol permit an exact visualization in vivo of the anatomical and pathological picture of the trachea and bronchi and their ramifications. With it one can observe displacement of the trachea and bronchi, dilatation and stenosis, excavation, cavitation and abscess formation. This is of the utmost importance before surgical intervention; and where the ordinary clinical diagnosis is not clear, the use of lipiodol becomes imperative.

In septic putrid conditions, lipiodol appears to have a favorable therapeutic effect. The authors have administered the lipiodol directly through the larynx and regard this procedure as the simplest and least dangerous, especially if repeated injections are necessary. Two cases are briefly cited.

ARENS, ROBERT A., and BLOOM, ARTHUR R. Congenital stenosis of the esophagus in a woman aged 67: Involvement of cardia and middle third. *Radiology*, February, 1926, vi, 163-165.

A case is reported in a woman aged sixty-seven. The physical examination revealed nothing of importance other than that the patient was under-nourished, weighing 97 pounds. A No. 30 bougie was passed easily while a No. 34 met with obstruction at 42 cm. A roentgenoscopic examination disclosed a marked dilatation of the esophagus in its upper third extending down to the level of the angle of Ludwig.

The lumen of the esophagus at this point was constricted and irregular, somewhat serrated in outline. The opaque medium passed downward through this constricted portion into the dilated portion below. Repeating the examination it was discovered that the lower two-thirds of the esophagus was tremendously dilated. It held at least one quart of liquid and resembled somewhat an undescended or even-trated stomach. Only a very small quantity of barium passed through the cardia even in the face of huge, deep-cutting hyperperistaltic waves attempting to force the meal onward. The barium was retained in the lower portion of the esophagus for over twenty-four hours. The upper dilated portion above the constriction emptied within fifteen minutes.

Because of the smoothness of the cardiac end of the esophagus, the marked dilatation, hyperperistalsis, etc., it was concluded that this was undoubtedly a case of cardiospasm, either congenital or acquired, with a constriction at the lower level of the upper third, the precise nature of which although not disclosed was apparently non-malignant. At operation the cardia was found to consist of a markedly thickened ring due to hypertrophied circular muscle. This was resected and removed, a transverse incision was made in the stomach and a sigmoidoscope passed up into the lumen of the esophagus. This met with an obstruction opposite the third intercostal space. The obstruction could be seen as a smooth ring resembling that at the cardia. The pathologist found no other pathological changes and no evidence of malignancy. This case is unique in that it is evidently one of congenital stenosis of the esophagus associated with stenosis of the cardia in a woman aged sixty-seven.

BEYE, HOWARD L. Dermoid cysts of the mediastinum. *Ann. Surg.*, May, 1926, lxxxiii, 577-584.

Dermoid cysts of the mediastinum are rare tumors, only 118 having been reported. Patients suffering from such tumors may be cured or relieved by operation.

Mediastinal dermoids should be given due consideration in the diagnosis of all cases suggesting intrathoracic new growths or obscure infections. Exploratory thoracotomy is indicated when the presence of a mediastinal dermoid is suspected.

These tumors occur at all ages, but most of the cases are found in patients between the ages of fifteen and thirty. Occasionally a blow on the chest or an infectious disease has been noted as the apparent cause of tumor growth. Roentgenographic and roentgenoscopic examination in the typical case may show a well-

outlined spherical shadow surrounded by normal lung, and having no expansile pulsation. Calcification of the wall of the tumor may be demonstrable in the exceptional case. The finding of tooth-like shadows in the silhouette of the tumor itself would be significant. In cases with an effusion into the pleural cavity, the typical roentgenographic picture would be greatly masked. Differential diagnosis must take into consideration solitary intrathoracic tumors, aneurysm, and pleural and pulmonary infections.

A report is given of a case occurring in a man aged twenty. The roentgenogram of the chest showed a dense shadow in the left side from the fourth rib to the diaphragm. The upper border of this shadow was well outlined and slightly convex upward. A diagnosis of chronic empyema was made. Operation disclosed the presence of a dermoid cyst. The patient made an uneventful recovery.

CAMP, JOHN D. Recurring mucous cyst of the stomach: Report of a case. *Radiology*, March, 1926, vi, 257-259.

A case is described in a boy aged seven who complained of vomiting and diarrhea of six weeks' duration. In the upper right quadrant, somewhat to the midline, could be palpated a mass about 4 cm. in diameter, which was tender to deep pressure and freely movable. A roentgenological examination showed the stomach to be in normal position. The curvatures appeared smooth and freely movable. Peristalsis was normal. There was no retention from the motor meal and the first portion of the duodenum appeared normal in contour. There was a palpable mass about 4 cm. in diameter adjacent to the greater curvature in the region of the pylorus. The mass moved with the stomach and the greater curvature appeared to be indented by it. This was most marked in the prone position. Normal gastric rugae were present. The roentgen findings suggested an extra-gastric tumor or a tumor attached to the walls of the stomach.

Operation disclosed a cystic tumor on the posterior wall near the greater curvature and just proximal to the pylorus. The tumor proved to be a thin walled cyst filled with glairy mucus. There was a second cyst on the posterior wall about 1.5 inches in diameter filled with the same material. No connection between the cysts and the lumen of the stomach could be demonstrated. The patient was completely relieved of his vomiting and was discharged one month after operation. He was re-admitted five months later. Ten days before the second admission he began to vomit with increasing severity so that at the time of admission he was

unable to take any food without regurgitating most of it. On physical examination a hard mass about the size of a hen's egg could be palpated beneath the old incision. It was movable and not tender. A roentgen examination at this time showed a rounded filling defect on the greater curvature of the stomach corresponding to the palpable mass, in the region of the pylorus and the first portion of the duodenum. The mass moved with the stomach which was somewhat limited in mobility. Peristalsis did not pass over the involved area and there was a retention of about one-third of the motor meal at the end of six hours. The portion of the stomach above the defect appeared normal and peristalsis was present. The roentgen findings were those of gastric neoplasm or a neoplasm extrinsic to the stomach and attached to its walls. Operation disclosed a rounded tumor firmly adherent to the transverse mesocolon. It measured about  $2\frac{1}{2}$  inches in its greatest diameter and was situated directly over the pyloric ring towards the inferior margin of the stomach. The mass was dissected out and the wound closed without drainage. The pathologist described the specimen as a plum-sized cystic tumor with a smooth outer surface. The structure was considered consistent with a diverticulum or a cyst formed from the stomach. A small gland attached to the specimen was found to be normal. The patient made an uneventful recovery and was completely relieved of his vomiting.

BUTLER, P. F., and HABBE, J. E. Problems in diagnosis and treatment of metastatic tumors in the chest. *Radiology*, May, 1926, vi, 400-408.

The condition of "silent metastasis" is more frequently found with secondary new growths in the chest than in any other region. Not merely are the symptoms absent, but quite often there are no physical signs, especially when the nodules are deeply seated.

The treatment of metastatic tumors has not yet reached the stage of recognition and acceptance. However, with an ever increasing knowledge of the cancer problem and wider empirical knowledge of the response to radiation, there is justification in treating selected cases of metastatic malignancy in the chest with a reasonable hope of positive benefit to the patient.

Brief reports are given of 3 cases in patients who could not receive roentgen therapy for one reason or another. The absence of symptoms of chest metastasis was characteristic. Two other cases are reported in which the treatment was of questionable benefit.

Coöperation is needed between surgeon and roentgenologist in order that unnecessary and

even harmful operations be prevented where undoubted roentgen evidence of metastatic malignancy is established before operation. All cases of metastatic malignancy in the chest are not suited to radiation therapy, but when the indications are favorable marked amelioration of symptoms and temporary remission of the disease can usually be accomplished.

CAMPIONE, G. Abnormal deformity of the pelvis and knee secondary to recurrent articular rheumatism. *Arch. di radiol.*, March-June, 1926, ii, 242-245.

A case is described in a peasant boy of fifteen. Until about a year ago he had been well when pain began in the right knee. Since then he has had recurrent attacks of pain and swelling in different joints but without fever. After two attacks he was treated by injections of some sort, the nature of which is unknown.

The roentgen findings were abnormally severe for a case of this kind and of this duration. The first roentgenogram showed the whole pelvis deformed and reduced almost to the form of a heart, with rarefaction of the bones of the pelvis. The coxo-femoral joint on the right was indistinct, especially the interarticular line. The acetabulum and the head of the femur were rarefied and the femur was rotated forward. On the left side the changes were even more marked; the head of the femur in addition to being rarefied was subluxated upward; its outlines were not clear and the acetabulum was also rarefied and hazy. The roentgenogram of the knee-joints showed them in forced flexion, and while the right one showed clear outlines with rarefaction of the heads of the joint, the left one showed subluxation of the femur on the tibia; the outlines of the bones were clear but they were greatly rarefied. Such serious deformities are unusual and they were probably due to the rather delicate constitution of the patient and to improper and insufficient treatment.

CASTELLI, CARLO. Freud's syndrome in a case of carcinoma of the jejunum. *Radiol. med.*, June, 1926, xiii, 421-427.

The author describes a case of tumor of the jejunum diagnosed by the aid of roentgen rays which presented the following roentgenological signs: small triangular dilatation of a part of a loop of the small intestine and absence of the valvulae conniventes without dilatation of the part of the intestine above the lesion. According to the symptomatology described by Freud in 1916, this would have been diagnosed as a sarcoma of the small intestine. But examination of the specimen which was removed by a successful surgical operation showed that it



was a carcinoma. The author emphasizes the fact that it is dangerous to judge of the nature of a lesion from the roentgen examination alone.

CODMAN, E. A. Registry of bone sarcoma. *Surg., Gynec. & Obst.*, March, 1926, xlii, 381-393.

Five criteria are furnished by the histories of osteogenic sarcoma cases: (1) if pain precedes other symptoms one may suspect that the case is one of osteogenic sarcoma; (2) if the patient has sought advice in less than a month or more than a year from the onset of symptoms one may suspect that the case is not one of osteogenic sarcoma; (3) if the patient is considered in good health just before onset one may suspect osteogenic sarcoma; (4) osteogenic sarcoma has never been observed in any patient over fifty years of age except cases having a coincident Paget's disease; (5) osteogenic sarcomas as a rule show steady enlargement, practically always noticeable in a month.

Five additional criteria are furnished by the examination: (1) osteogenic sarcoma almost always causes a peculiar fixation of the soft parts; (2) the situation of a tumor may direct suspicion to osteogenic sarcoma; (3) typical osteogenic sarcoma does not present, especially in its early stages, pronounced fever, tenderness, redness, leucocytosis, etc. Such symptoms may occur in exceptional cases. Radiation may produce them temporarily; (4) osteogenic sarcoma rarely invades neighboring joints until late in the course of the disease. Presence of the tumor does not involve the motion of the joint except in proportion to the fixation of the soft parts; (5) if a tumor is not of considerable size or if it is pedunculated, one may suspect it to be not an osteogenic sarcoma.

The roentgen ray furnishes five fairly constant criteria: (1) combined central and subperiosteal involvement. The little cuff of reactive bone of trumpet shape which surrounds the upper limit of the tumor appears in the roentgenogram as a triangular space on each side of the shaft under the uplifted periosteal edge. The presence of this is a sure indication of subperiosteal, extracortical involvement. The same phenomenon sometimes occurs as a defense reaction against inflammation, so that this reactive triangle in itself is not diagnostic of sarcoma. (2) The presence of old shaft,—in osteogenic sarcoma the perforation of the cortex seems to be, as a rule, transverse from within outward radially through the cortex, or perhaps in the opposite direction. There is no clue as to whether they start inside or outside the cortex. If new bone forms it follows these radiating lines. One must think of these radi-

ating lines not as they show in the roentgenogram as spicules but as they really are in the gross specimen as ridges or osteophytes of irregular form on the surface of the cortex. (3) Invasive character,—osteogenic sarcoma advances by the invasion of the cells and the margin is irregular. (4) The typical roentgenogram shows the tumor to be both osteolytic and osteoblastic, although in rare cases, when far advanced, these tumors may be of only one type. The frequency of the sign of spicule formation is not enough to form a rule, and the absence of it is not very strong evidence against osteogenic sarcoma. (5) Involvement of soft parts,—this is a difficult point on which to interpret the roentgenogram. A tumor which does not show in the roentgenogram either invasion of the soft parts or the reactive triangle may perhaps not be an osteogenic sarcoma.

The microscope furnishes five additional criteria: (1) mitoses and hyperchromatism; (2) pleomorphism; (3) tumor giant cells; (4) differentiation; (5) vascular arrangement within the tumor.

In conclusion there are five general criteria of malignancy in bone tumor which appear to be important: (1) the nature of the pathological examination; (2) the quality of the data; (3) the unanimity of the different specialists; (4) the Registry classification; (5) the ultimate result.

Brief summaries are given of 13 cases of five year cures of osteogenic sarcoma. The site in all cases was either the tibia or femur, and amputation was performed in all but one case. In 5 cases the credit for cure must be given to amputation alone, except that one of these also received diffuse roentgenization by the Murphy method. Coley's toxins were used in at least 5 of the cases, usually in conjunction with radiation. In one case the cure must be credited to either the toxins or radium, or both. These 13 cases represent the best evidence of five year cures so far collected by the Registry of Bone Sarcoma.

COLE, WALLACE H. Chondrodysplasia. *Surg., Gynec. & Obst.*, March, 1926, xlii, 359-365.

Ollier's disease is a term which seems fixed in the literature but which should be used only to designate those cases of cartilaginous dystrophy with or without cartilaginous tumor or exostosis formation which show an asymmetrical involvement of the body as the distinct clinical feature. Chondrodysplasia is a condition which may be either symmetrical or asymmetrical.

A report is given of a case occurring in a girl aged eleven. A roentgen study of the skeleton disclosed a peculiar condition present most



prominently in the right ilium, femur, tibia and second metatarsal bone. The upper extremities and spine were apparently negative. The right ilium showed in its wing a vacuolated area with increased density around it and rarefied areas above the acetabulum. The pubic bone showed slight similar changes. The right femur was much shorter and thicker than normal and two large tumor masses were present, one apparently originating from the shaft near its center, and causing distortion, with a smoothly surfaced, slightly irregular vacuolated mass projecting medially, and the other occupying the lower end of the bone and causing a symmetrical swelling with intact outline but showing in its body a very striking mottled appearance.

The upper and lower ends of the right tibia showed swellings similar to that in the lower end of the femur. The fibula was apparently not involved and was consequently very long in comparison to the shortened and thickened tibia. The first and second metatarsal bones and the phalanges of the great and second toes and to a lesser extent of the other toes of the right foot were involved and showed a series of vacuolated areas with dense striations in and around them. The shortening of the second toe was seen to be due to the condition in the second metatarsal bone. The left femur showed a slight thickening and spindle-like enlargement in its middle and the upper end of the shaft, and the neck showed definite rarefied areas with no tumor formation. A biopsy was performed and a portion of the tumor mass in the upper end of the tibia was removed and examined. A diagnosis of chondrodysplasia with the formation of osteochondroma was made, the benign character of the lesion being assumed. No treatment seemed to be indicated.

CONN, H. R. Fractures of the os calcis: diagnosis and treatment. *Radiology*, March, 1926, vi, 228-235.

Fractures of the os calcis are serious and disabling injuries in which the end results continue to be "incredibly bad." The lesions divide themselves on a basis of the predominating deformity into five major groups with specific indications for surgical treatment. These groups are: (1) an eversion of the bone with a more mesial deflection of the weight bearing line; (2) upward displacement of that portion of the posterior tuberosity serving as the attachment for the Achilles tendon; (3) impactions resulting in shortening and upward displacement of the posterior tuberosity, without separation of the Achilles tendon; (4) serious distortion of the reciprocal articulating surfaces; and (5) those

cases in which by reason of the location or because of destructive comminution non-union is impending or present.

It is important to the patient that the roentgenologist recognize the major deformity which presents itself and acquaint the surgeon with its presence and significance. The mere discovery of a solution in the continuity of the calcaneum in no manner discharges the roentgenologist's obligation. The surgeon is entitled to a stereoscopic lateral view of the suspected os calcis, and a view taken through the posterior tuberosity in the anteroposterior plane. The ancient cases in which early treatment has terminated unhappily demand equally careful roentgenography and perhaps an even better appreciation of the significance of the major deformities. Roentgenograms should be taken so as to reveal both the lateral and perpendicular deviations which may be present.

The indications for treatment are entirely dependent upon the recognition of the predominating deformity or combination of deformities. In the recent lesions, procrastination, attempts at manual reduction, and ineffectual immobilization should be abandoned for the more radical and efficient direct traction procedures, tenotomy of the heel cord and, when indicated, sub-astragaloid arthrodesis. Applied to both the recent and the ancient cases, sub-astragaloid arthrodesis deserves a much more general acceptance than it is now accorded.

DANDY, WALTER E. The diagnosis of brain tumors. *J. Iowa State M. Soc.*, March, 1926, xvi, 101-102.

In the group of brain tumors that cannot be localized by the usual methods of neurological and roentgenological examination, comprising at least 35 per cent of all brain tumors, the localization can now be made by injecting air into the spaces of the brain. The procedure consists in withdrawing cerebrospinal fluid from a lateral ventricle, injecting air and taking roentgenograms of the head in various positions in order to show the various parts of the ventricular system. From the changes which are found by contrast with the normal cerebral ventricles the expert is able to deduce the situation of the tumor. This is not to say that all brain tumors distort or change the size, shape or position of the ventricles, but that all brain tumors which give symptoms of pressure produce one or more of these changes which should make a diagnosis possible.

There is one group of tumors in which the use of air is less absolute. This is the group which gives a bilateral hydrocephalus and in which two lateral ventricles communicate freely. All one can say from the ventriculograms is that

there is a lesion between the aqueduct of Sylvius and the foramen of Magendie, but with very few exceptions this is sufficient information to permit one to find the tumor at operation.

The procedure of ventriculography is very dangerous, but if judiciously used and only by one thoroughly skilled in intracranial surgery the danger is minimal. There are many pitfalls in the interpretation of the roentgen findings and much experience is required in their analysis.

DAVIS, E. C. Malignant diseases of colon, cecum and appendix. *J. Med. Ass. Georgia*, May, 1926, xv, 175-178.

The most common sites for malignancy in the large intestine seem to be at the points where friction and stasis most commonly occur, namely, the cecum, sigmoid, hepatic and splenic flexures, named in the order of their frequency. The early signs of malignant disease are the presence of mucus and blood in the stools followed later by small masses of breaking down tissues. These same signs are found in several other disease conditions of the rectum and colon so that they alone would not be positively diagnostic. Roentgen study with the aid of the opaque enema is the most important diagnostic means available but this examination must be done by an expert to be of any value.

Treatment depends entirely upon the earliness of diagnosis. Even with the availability of radium and deep roentgen therapy the safest and surest cure for malignancy in the colon and rectum is early diagnosis and radical removal. The author's experience with roentgen and radium treatment of advanced cases has been very satisfactory. Radiation therapy alone in these cases has been so far negligible, and the author wonders if they have not stimulated or excited the cancers to renewed activity.

EISENDRATH, DANIEL N., and ARENS, ROBERT A. Variations in normal pyelograms. *Radiology*, June, 1926, vi, 474-480.

There are a number of normal renal pelvis which when filled with opaque media greatly resemble the so-called "spider deformity" due to renal neoplasm. The authors have therefore thought it would be of service to determine from their material the variations of the normal renal pelvis as seen in the pyelogram in order that mistakes in diagnosis might be minimized. The pyelograms utilized in the present study were chiefly those of the opposite side to that to which the clinical symptoms and findings pointed. In the remainder they were obtained in cases where all findings were negative.

The material can be most conveniently divided into groups. Some of the pyclograms exhibit simple variations of the ampullary pelvis. Others show the transition of one form of the latter, viz., the one with a long cephalic major calyx into the bifid pelvis, and this again into the kidney with two separate pelves. A third large group is the "pseudospider" type of normal pelvis; and there is a final group which the authors are unable to classify.

In the classical ampullary type of renal pelvis the almost quadrilateral expansion of the pelvis proper is most marked, there being a gradual narrowing toward the uretero-pelvic junction. As a rule the necks of both the major and minor calyces are quite narrow but there is much variation in this character. There are, naturally, deviations from the classical ampullary type. In some there is a tendency towards predominance of the pelvis over the calyces and vice versa. There may also be marked elongation of the cephalic major calyx in pelves which still adhere to the basic ampullary type. Another variation is found in cases where the pelvis instead of having more or less equal horizontal and vertical diameters reveals a predominance of the horizontal over the vertical.

The narrow horizontal pelvis with the extreme laterally placed and long cephalic major calyx differ greatly from the types which have hitherto been called normal. These "pseudospider" pelves may have a long superior major calyx so narrow as to simulate compression by tumor or exudate; or the horizontal pelvis may have a wide outlet into the ureter with a superior major calyx arising from the outer lateral border of the pelvis, with long narrow necked superior and middle major calyces resembling pyelographic deformity of neoplasms. There may also be the narrow horizontal pelvis proper with inferior major calyx arising from the superior major calyx. In such cases a comparison of the shadows obtained from both kidneys may help in establishing the diagnosis. This is a most important group with which the roentgenologist and urologist should be familiar. The close resemblance of the pyelogram to that seen in the spider deformity of neoplasm is a point to be remembered.

ELIASON, E. L. Pylephlebitis and liver abscess following appendicitis. *Surg., Gynec. & Obst.*, April, 1926, xlii, 510-522.

Pylephlebitis and liver abscess are not identical and occur as a complication in from 0.1 to 0.4 per cent of cases of appendicitis. The roentgenogram and roentgenoscope aid in early diagnosis by showing a high diaphragm, sometimes with restricted movement.

Local edema and prominent veins are valu-

able diagnostic signs. Pain is not always present, and is noted most when the infection is in or on the upper surface of the liver. Pneumonic signs are frequently the result of lung compression rather than pneumonia. Jaundice is practically a constant symptom. Lassitude and anorexia are very suggestive in the diagnosis.

The prognosis is not universally bad as 54 per cent of the cases recover. Operation through the diaphragm is the treatment of choice. Descriptions are given of 14 cases.

Roentgenographic examinations were made in 10 cases, with negative findings in only two. The other 8 cases showed elevation of the right side of the diaphragm and in some instances restriction of movement on that side. In 3 of the cases there was also a shadow in the lower right chest interpreted as fluid. This shadow appeared only in those cases in which the upper surface of the liver was abscessed. These roentgen findings are extremely interesting as they seem to point to the fact that pus in the liver will give much the same phenomena as will subdiaphragmatic pus. In practically all of these cases the clinical diagnosis at first was a basal pneumonia or a subdiaphragmatic abscess, but before operation in each instance the proper diagnosis of liver abscess was made.

EUSTERMAN, GEORGE B. The newer clinical aspects of gastric carcinoma. *Radiology*, May, 1926, vi, 409-416.

During the years 1918 to 1920, inclusive, there were observed at the Mayo Clinic 1408 patients with gastric carcinoma. In 777 no operation was carried out because the majority of these were inoperable as judged from the physical or roentgenographic examination. Of 631 who underwent operation, 80 had carcinomatous ulcers. Palpable masses were found in 51 per cent of cases, gastric retention in 60 per cent, anacidity in only 55 per cent. A radical operation for resection of the tumor or lesion was performed in 46 per cent, some form of palliative operation in 16 per cent, and in the remainder, 38 per cent, exploration only was done. Of further interest is the fact that 45 per cent of carcinomatous ulcers were regarded as simple benign lesions, 41.25 per cent as malignant ulcers, and 13.75 per cent as probably malignant ulcer. In other words, in more than 40 per cent of the cases of malignant ulcer the case history, clinical and roentgenological findings were indistinguishable from those associated with chronic benign gastric ulcer. Comparing these results with the data compiled by Friedenwald in 1914, it becomes evident that the lesions in the present series were detected at an earlier and more operable stage in general.

The symptoms are conditioned largely by the site and extent, and especially by the degree of motor impairment. Exclusive of the non-obstructing small lesions and of some of larger extent in a high lying stomach, the majority of the cases of gastric carcinoma are readily diagnosable as such on the basis of history, physical examination and gastric analysis. In these the roentgenoscopic and roentgenographic findings serve to confirm the diagnosis, determine the situation and extent of the lesion, and furnish criteria of operability so far as the stomach itself is concerned. A negative roentgenologic examination of the stomach is also of great value in those cases of constitutional diseases, chronic toxic or septic states which cause gastric disturbances and other symptoms which may erroneously be attributed to the presence of gastric carcinoma.

Roentgenologic indications of malignancy, such as the niche type of ulcer with an unusually large crater and the roentgenoscopic demonstration of ulcerating carcinoma with a meniscus-like crater are significant diagnostic advances. In the presence of such findings surgical interference should not be delayed, other things being equal. In the detection of malignant transformation of a benign ulcer, the alert clinician can frequently elicit a slight suspicious change in the nature of symptoms even before there is anything characteristic in the examination of the test meal or roentgenologic findings, or even indeed before any signs of malignancy can be grossly seen in the ulcer. About 8 per cent of carcinomatous ulcers occur in patients less than forty years of age. With our present available methods of diagnosis it is usually impossible to distinguish them from benign ulcer.

Gastric ulcers in patients past middle age may be considered benign in the presence of adequate acidity even though the symptoms may be of short duration; and gastric ulcers in elderly patients usually remain benign in spite of long duration of symptoms. An adequate acidity is a fair clinical criterion of their non-malignant nature. It is reasonable to infer that roentgenologically depicted circumscribed lesions associated with subacidity or anacidity are potentially or actually malignant, with few exceptions. If there are such additional features as a large crater, tumefaction, early onset of obstruction, occurrence late in life, an irregular or progressive history in the absence of demonstrable complications, or inability to obtain adequate or complete relief by proper treatment then malignancy is highly probable and surgical interference should be urged.

Roentgenography of the stomach in expert

hands has reached such a state of efficiency as to be almost an exact science. But circumstances are constantly arising which make essential the cooperation of all diagnosticians. Incomplete examinations as well as unskillful ones or faulty interpretations are prolific sources of error in diagnosis and treatment. Four cases are briefly cited.

FITZGIBBON, JOHN H. Bile duct obstruction demonstrated by the sodium tetraiodophenolphthalein method. *Radiology*, May, 1926, vi, 429-431.

Salol coated pills of sodium tetraiodophenolphthalein were taken by a patient, aged sixty-five, with obstructive jaundice, the resulting reaction being only slight. A satisfactory gall-bladder shadow was obtained which increased markedly in size after the taking of food. A gallstone present in the gall-bladder was not seen on the film probably because of thick gall-bladder contents surrounding it. The marked change in the size of the thickened, diseased gall bladder showed that considerable elasticity remained in spite of long-standing infection.

At operation, in addition to the above findings there was observed at the junction of the cystic and common ducts a hard mass extending toward the liver. This was thought to be malignant. A small piece of the gall-bladder removed for examination was found to show marked chronic cholecystitis and possibly early scirrhous carcinoma.

FREIBERG, ALBERT H. The so-called infraction of the second metatarsal bone. *J. Bone & Joint Surg.*, April, 1926, viii, 257-261.

A revision of the cases reported and those which have been more recently observed by the author shows that the thickening of the metatarsal shaft is uniformly present, and that it stands in no constant relationship to the deformity at the end of the bone which has taken place in the condition described as infraction of the second metatarsal bone. If this be true, the observation by Köhler constitutes an important element of this condition and one which the author failed to note in his original contribution in 1914. A brief report is given of a case occurring in a boy aged thirteen suffering for nine months from pain in the metatarsophalangeal joint of the second toe of the right foot. A roentgenogram failed to show the characteristic changes in the end of the metatarsal bone; it was not widened in its transverse diameter and the joint line was also not wider than that of the opposite side. There were no indications of loose bodies. A second roentgen exami-

nation was made nine months later and at this time it was noted that the thickening of the head of the metatarsus was still present and there was an increase in density of the bone. The interpretation of this change in the second metatarsus occurring within a period of eight months is a difficult matter without more evidence. The author believes that the present case represents a very early stage of so-called infraction of the second metatarsal bone.

GRAHAM, E. A. Gall-bladder diagnosis from the standpoint of the surgeon. *Radiology*, April, 1926, vi, 273-278.

The frequency of disease of the gall bladder is now attested by the fact that it constitutes the most common organic cause of dyspepsia; and the importance of accurate methods of diagnosis is obvious. Hepatitis is a constant accompaniment of cholecystitis. If this hepatitis continues for a sufficient length of time, the typical picture of a well-marked biliary cirrhosis is present with enormous thickening of the walls of the intrahepatic bile ducts, atrophy of the lobules, fibrosis and contraction of the liver capsule, etc. Cholecystitis nearly always begins in the wall of the gall bladder and not in the mucous membrane. Infection of the liver spreading through the lymphatics of the gall bladder causes a peripheral lymphangitis of the gall bladder which may or may not spread to the mucosa. Hence any lesions which predispose to a hepatitis are likely to predispose to cholecystitis. Moreover, there is evidence to show that a vicious circle may exist between the liver and gall bladder whereby each may reinfect the other through the lymphatics. Cholecystitis therefore is a condition demanding serious attention not so much because the gall bladder itself is involved as because this inflammation carries with it possibility of involvement of the liver and pancreas.

In the method of cholecystography we have a means by which one can examine the only two functions of the gall bladder which have been thus far discovered, namely, the function of concentrating its contained bile and the function of regulating the pressure within the system of biliary ducts. By this method a normal gall bladder will show an increasing density of its shadow during a certain period, indicating the presence of the power of concentration, and it will also show changes in size which indicate distensibility or power to regulate pressure changes in the biliary tract. Cholecystography is preeminently a functional test of the gall bladder, and does not necessarily reveal the exact pathological lesions. Because it is a functional test cholecystography pro-

vides a more accurate method for recognizing early and mild cases of cholecystitis than any other method. Incidentally it very often reveals stones, adhesions, etc., which are not revealed in other ways.

In a series of 700 cases examined by cholecystography this method was found more accurate than any other. In several instances it furnished positive evidence of the nature of the patient's trouble when clinical evidence was misleading. The author's percentage of correct diagnoses by this method averages 93 per cent.

It has been found that the sodium salt of phenoltetraiodophthalein not only makes possible the visualization of the gall-bladder, apparently equally as well as its isomer, sodium tetraiodophenolphthalein, but it also stains the blood serum sufficiently to enable its detection after alkalization. Roentgenograms of the gall bladder of nearly maximum intensity have been obtained in normal subjects within four hours after injection of 0.055 gm. per kilo of body weight. No general toxic reactions have occurred so far in any of the patients injected but there has been a slightly greater tendency to venous thrombosis at the site of injection. Because of possibly faster excretion of this dye through the liver it may shorten the time now required for a cholecystographic examination. Further work with this compound needs to be done before it can be recommended for general use.

GRANT, OWSLEY. Shadows in the urinary tract, from a practical urological view. *Radiology*, June, 1926, vi, 481-486.

Whenever the cystoscope reveals two or more stones in the urinary bladder the patient is roentgenographed by the author to determine if possibly other stones have not been overlooked. It is not always easy to obtain a perfect view of the bladder at cystotomy or of the pelvis at pyelotomy; and it is an easy matter to overlook a urinary calculus lying amid the folds or crevices of a collapsed viscus. No urological diagnosis should be made from the roentgenologist's report alone. The plate itself should be studied by the urologist. It is urged that the roentgenologist be circumspect in his statements as to the diagnosis. The best ends will be accomplished only by the roentgenologist and urologist working constantly together.

No suspected renal or ureteral bladder lesion should be diagnosed on a plate so small as to include only a portion of the tract. The best results are achieved with 14 X 17 plates. Repeated exposures on small plates are more expensive and less satisfactory than a com-

posite of the whole. To do pyelography outside the hospital is dangerous for the patient.

The pyelogram can be read with only approximate accuracy in many borderline cases. In the diagnosis of large hydro- and pyonephrosis the situation is plain, but the normal pelvis varies so greatly that if the picture is not positively diagnostic the burden of proof must rest on the clinical findings. This is especially true in suspected hypernephroma. If plates are only partially satisfactory for any reason, they should be repeated until they are wholly so, and no attempt should be made to read into plates something that is not definitely shown.

The most satisfactory opaque medium for pyelograms is a solution of 12.5 per cent sodium iodide in 1:3000 mercury biniodide colored with methylene blue.

The chief causes for misinterpretation of pyelograms are (1) incompletely filled pelvis; (2) spasm of the pelvis and ureter; (3) deformed pelvis; (4) position of the patient; (5) rotation of the normal kidney.

Roentgenography is of great use in urology for three other diagnostic purposes: (1) the diagnosis of a stone in a diverticulum of the bladder or the ureter which may easily escape the urologist's examination; (2) the detection of small particles of stone at the operating table, and (3) the detection of cancer metastases.

HARBIN, MAXWELL. Non-suppurative osteomyelitis, with report of an unusual case. *J. Bone & Joint Surg.*, April, 1926, viii, 401-404.

The case is of interest particularly because of its involvement of the body of the os calcis together with the epiphysis. Its behavior is similar to that seen in the long bones with slightly different changes due to the variation in structure of the tarsals. When considered from the standpoint of the epiphysis, however, the roentgenogram strongly suggests an epiphysitis with thickening of the proximal part.

The patient, a boy aged fourteen, was admitted to the hospital complaining of a pain in the left heel. There was a scar 1 cm. long underneath the heel. Roentgenograms of the chest were negative and those of the heel showed what appeared to be destruction throughout the epiphysal portion. There was increased density of the entire body of the bone with proliferation of the periosteum on the lateral aspect. A portion of the bone was removed at operation and a search through many sections failed to show the presence of any organisms. The pathological diagnosis of the tissue was fibrous and chronic inflammation. The history of an infection is quite clear

and the symptoms rather typical. One is impressed with the similarity of the roentgenographic findings to those of epiphysitis occurring in the long bones, tending to establish a rather strong case for infection as an etiologic factor in its production.

HERMAN, KARL. The method of Graham. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, January, 1926, xxxiv, 121-128.

Cholecystography according to the Graham method is regarded as the best method of roentgen diagnosis of the gall-bladder, and may be employed by the practitioner for ambulatory cases. The procedure requires further improvements; and in this connection, the oral method of administration of the dye can be made to yield satisfactory results. The best way to avoid severe toxic reactions when the dye is administered intravenously is to inject it very slowly. Of course the patients must show no contraindications to the administration of the dye. The author has employed the tetrabromphenolphthalein salt and reports that the earlier specimens were not very stable. The dye should not be exposed to the light because of decomposition occurring. It is emphasized that the technique of injection is much more important than that of taking the roentgenograms.

The most striking fact brought out by the new method of cholecystography is that the position of the normal gall bladder is extremely variable. It is also pointed out that so-called secondary signs of gall-bladder disease are not necessarily always pathognomonic. Indentations of the bulbous duodeni, of the canal of the jejunum and of the colon may be produced by a normal gall bladder; in other words, not every indentation is pathological. The observations of Sherwood Moore on this matter are confirmed by the author. Now and then circular opacities or transparencies appear on the gall bladder shadow, suggesting positive or negative stone shadows. These are artificial structures due to the shadow of the transverse process superposed upon the gall-bladder shadow. Similar pictures may be caused by intestinal gas. The lateral boundary of the psoas muscle may also be mistaken for the boundary of the gall bladder. In order to avoid this error it is necessary to outline the complete contour of the gall bladder.

The following criteria are necessary for a good cholecystogram: (1) A clearly outlined picture of the vertebrae; (2) lighter shadows of the last two ribs and of the transverse processes of the 11th and 12th thoracic and the first to the fourth lumbar vertebrae; (3) the gall bladder should be distinctly visible; (4)

the lower edge of the liver should be visible; (5) the psoas muscle and kidney are quite frequently present but they are not absolutely necessary.

HERMAN, LEON. Pyelography in renal diagnosis. *Ann. Surg.*, February, 1926, lxxxiii, 227-239.

The author urges a complete urological study in obscure abdominal conditions, and especially in those in which upper abdominal pain is the prominent feature. It is in the study of the unusual case that pyelography is most likely to yield important diagnostic data. Pyelography is not a procedure that can be employed with safety in cases presenting marked dysfunction of the kidneys, neither should it be used routinely in the study of the more or less obvious renal lesions. It is a diagnostic measure to be employed supplementary to the routine cystoscopic examination.

Technical perfection in pyelography implies equal appreciation on the part of the urologist of its diagnostic value. The examination must be conducted by one familiar not only with roentgenology but also with pyelographic technique and the wide range of pelvic deformities which it reveals. The roentgenoscopic method is employed in cases where it is desirable to observe the range of mobility of the injected pelvis as in the diagnosis of movable kidney and in the differentiation of renal from extra-renal mass. For other purposes stereoscopic Bucky diaphragm plates are easier to interpret and yield more valuable data with greater certainty.

Mention is made of the findings in a human case in which for reasons as yet unknown, the pyelographic medium was forced into or entered the already open uriniferous tubular system as evidenced by the roentgenogram.

The pyelogram may yield important diagnostic data in renal as well as in extra-renal conditions in the entire absence of alterations in renal function or other evidence deducible from cystoscopic investigations.

HUNSBERGER, H. S. Unusual bone formation in the pelvis. *Radiology*, May, 1926, vi, 431.

In a woman aged seventy admitted with a diagnosis of arthritis, a temperature of 101° and a tender left hip, the roentgen examination revealed an old fracture of the neck of the left femur and the presence of a slender piece of bone anterior to the acetabulum. This fragment resembled a misplaced bone graft but the patient denied ever having been treated for a fracture. She had had a serious injury four years previously.

The roentgenogram of the entire pelvis



showed an ununited fracture of the neck of the left femur with considerable upward and backward displacement of the shaft; fractures of both rami of the left pubis; marked expansion of bone at the site of the fracture in the inferior ramus, with very little calcium, the bone here being a mere shell. The slender fragment mentioned above was seen to be about 11 cm. long  $\times$  1.3 cm. wide and to extend downward and forward into the adductor muscles from the site of the fracture in the superior ramus. This bone had a cortex as thick as that of the femur, and a medullary space, but the bony trabeculae were not clear. It is concluded that this bone fragment resulted from a periosteal tear at the time of the injury.

JACKSON, CHEVALIER, and SHALLOW, THOMAS A. Diverticula of the oesophagus, pulsion, traction, malignant and congenital. *Ann. Surg.*, January, 1926, lxxxiii, 1-19.

The opinion is expressed that the cricopharyngeal muscle is the important factor in the etiology of pulsion diverticulum. From esophagoscopic studies it is concluded that a barrier is presented to the advance of the bolus by the unrelaxed cricopharyngeus that constitutes the functional factor leading to herniation of the pharyngeal wall, thus creating the pharyngeal diverticulum. The wall of the hypopharynx and esophagus is weak everywhere but is as strong here as elsewhere and seems better supported in the neck than in the thoracic region. But the thoracic esophagus does not have the obstruction ahead except in cases of so-called cardiospasm which is due in many cases, at least, to failure of the diaphragmatic pinchcock muscles to relax, in other words, a pathologic mechanism analogous to that present in pharyngeal diverticulum. The essential mechanism is not so much the pulsion of the oblique fibers of the inferior constrictor, as the failure in the coordinate obliteration of the normal obstruction ahead. The mechanism of so-called traction diverticulum is essentially different. The absence of anything corresponding to the cricopharyngeal pinchcock accounts for the well-known clinical fact that traction diverticula are usually unaccompanied by dysphagia. In the authors' opinion the true cause of traction diverticulum lies in the anatomical fact of the absence of an orbicular muscle below the diverticulum to act analogously to the cricopharyngeus which has been shown above to be a powerful factor in the etiology of pulsion diverticulum. Pulsion diverticula do not all spring from the one narrow location usually assigned to them.

A series of 13 cases is described more or less

in detail. There was but one female in the series. The average age of the patients was between fifty-five and sixty-five years. Two of the cases had malignancy. In the diagnosis of these the roentgenogram is uncertain and esophagoscopy is absolutely necessary. The results from the latter examination were conclusive.

JANSEN, MURK. March foot. *J. Bone & Joint Surg.*, April, 1926, viii, 262-272.

March foot is the well-known edematous swelling of the metatarsal region of the foot which occurs in persons who are made to walk beyond their strength. The pain, if present, is not severe and is often restricted to a feeling of stiffness in the mid-foot. There is no pain at all during rest, though pressure on the swollen parts may evoke it.

Roentgenograms show no changes of the bones at the outset. In the course of a few weeks, however, even thickenings of the metatarsal bones develop along their diaphyseal portions. They begin with a hazy, indefinite outline and gradually adopt the character of a well-defined shadow. Their width shows a notable parallelism with the number of interosseous fibers which originate from the various metatarsals and their parts, so that there is never a thickening of the first metatarsal, the lateral border of the fifth, and the heads and basal portions of the metatarsals, from all of which parts no interosseous bundles arise. The medial borders of the third, fourth, and fifth, from which both internal and external interossei originate, show more considerable thickenings than do the lateral borders of the second, third and fourth metatarsals, from which only external interosseous bundles arise. This parallelism between the tarsal thickenings and the number of interosseous bundles arising from the bony parts is of great moment with regard to the rôle ascribed to the interosseous muscles in the development of the condition.

Besides these even thickenings, spindle shaped thickenings and irregular prominences may develop on the metatarsal bones, situated below the periosteum. These spindle shaped and irregular thickenings are also limited to the areas of origin of interosseous bundles, and they are never observed in those parts from which no interosseous fibers arise. During or after the development of these phenomena a metatarsal fracture may occur without a preceding trauma or even a sensation of pain.

The primary agent in march foot seems to be a spasm of the interosseous muscles. The interossei normally allow the flow of lymph and blood



through penetrating blood and lymph vessels. In their spastic condition, however, this flow of lymph and of venous blood is impeded. Thus the hydrostatic pressure in the adjacent tissues is increased both in the soft and in the bony parts. The flexible parts respond with increase in bulk. The periosteum, which is also distensible, shares in the swelling which appears in the roentgenogram as an ill-defined thickening. Thus, there is brought about an even thickening of the periosteum which appears gradually to change into bone, forming a well-defined and permanent thickening.

The bony parts cannot respond to the increased hydrostatic pressure with expansion, and since a bone cannot withstand pressure acting at right angles to the direction for which it has been built, there occurs in those directions an absorption of lime salts which may account for the brittleness which some of the metatarsals develop.

March foot is to the mid-foot what spastic flatfoot is to the lower leg. It is antepes contractus or spastic mid-foot.

JELLINEK, STEPHEN. Changes in electrically injured bones. *Brit. J. Radiol.*, January, 1926, xxxi, 23-25.

Roentgenographic observations indicate that electrically injured bones show changes not merely at the point of contact of the electrical current, but within a more or less distant radius of that point where there is not the faintest external indication to lead one to suspect the existence of any change.

In one case, the hand and forearm of a boy were severely injured by a 5000 volt alternating current. In the course of four or five weeks the upper arm, which at first appeared uninjured, became mummified but no other changes were visible. A few days, however, before the spontaneous falling off of the whole arm, a very faint line of demarcation appeared, along which the spontaneous falling off took place. On neither side of this line of demarcation was there to be seen the faintest sign of any change in the roentgenographic shadow. Almost simultaneously with the appearance of this line there appeared an outer shadow, cylindrical in form and separated from the diaphysis by a shadowless space. A further notable fact was that the medullary cavity was closed up by hard tissue.

In another case, a boy's fingers were severely injured to the bone by a 16,000 volt alternating current. A similar outer shadow and shadowless space appeared not only where the finger was visibly injured but also in the region of the apparently uninjured metacarpus. This outer shadow which grew gradually broader during

the first few months, became narrower by degrees and completely vanished a year after the accident. Clinically no change could be observed.

In the third case, that of a man struck by a 2000 volt alternating current, the changes occurred immediately following the accident. A portion of the ulna exposed by the destruction of soft tissue showed a demarcation line, at first very faint but growing distincter during the course of weeks and months. On the periphery a very strong osteophyte formation set in, very jagged before sequestration but speedily growing perfectly smooth and even after sequestration.

A fourth case in a man struck by a 36,000 volt alternating current demonstrated an extraordinary tendency to growth. Three or four months after the accident a portion of the parietal bone fell away permitting the brain pulsation to be clearly seen. Throughout the whole process there was no brain irritation, the man is now as well as ever and the hole is filled up.

KAUFMAN, LOUIS R. Calculus of the kidney and ureter. *J. Med. Soc. N. Jersey*, March, 1926, xxiii, 124-129.

Roentgen examination covering the entire genitourinary tract is diagnostic in renal calculus, although more than 25 per cent of cases require a supplementary pyelogram. All ureteral calculi require cystoscopic study also. Postoperative roentgen examination will disclose fragments left at operation, such as occurred in 2 of the cases reported, cases which would otherwise be said to show recurrence later on.

Stones are found in erratic distribution and with associated pathology varying from simple pyelitis to destruction of the kidney. On the other hand, severe colic may be found in calculus with practically no serious pathology of kidney or ureter.

Treatment of renal calculus is expectant in the case of the inoffensive calculus located in the cortex of the kidney in the absence of associated lesions or symptoms warranting operation. Ureteral calculi will pass into the bladder in over 50 per cent of cases either spontaneously or following cystoscopic procedures of dilatation. The sovereign diuretic and stone remover is water in large amounts. The management of calculous disease of the kidney or ureter requires painstaking study by roentgen rays, cystoscopy, laboratory and sound clinical investigation including attention to the problem of focal infection, dietetic and general hygienic supervision and a conservative well-considered policy in the matter of operation adapted to the individual case.

The author presents a statistical summary of the observations in 34 patients studied clinically. The roentgenographic studies in all of the cases were positive but in a large number several roentgenograms with cystoscopic study were necessary for final diagnosis.

LAPENNA, MARINO. Roentgen syndrome of stenosis of the duodenum caused by ascarids. *Radiol. med.*, June, 1926, xiii, 438-441.

A child, aged eleven, who had always been well, was suddenly taken with intense pain in the abdomen, slight vomiting and diarrhea, no fever; abdomen greatly distended. Roentgen examination showed the barium passing quickly through an almost incontinent pylorus into the duodenum which looked like a large dilated loop. At the lower angle—beginning of the third part—the barium stopped suddenly. There was dilatation above this point and waves of peristalsis and antiperistalsis in the stomach and duodenum. After half an hour the barium appeared in the 4th portion of the duodenum, while the third portion was skipped. After four hours the stomach was two-thirds full; part of the barium had passed into the loops of the jejunum, but the first loop of the jejunum, like the third portion of the duodenum was skipped. In some of the lower loops the stripes characteristic of ascarids could be seen. After six hours the findings were almost unchanged and after ten hours the stomach still contained half of the opaque meal; barium had collected at the lower angle of the duodenum, with dilatation above it and active peristalsis and antiperistalsis. After twenty-four hours there was still some barium in the upper part of the duodenum, while the jejunum and ileum were empty and the colon normally filled. The author thought the lesions were too serious to have been caused directly by the ascarids and that there was a chronic mesenteritis. But operation showed the third portion of the duodenum and the first loop of the jejunum filled with solid masses of ascarids; there were less dense masses in the 4th portion of the duodenum and the remaining loops of the jejunum. The most compact masses were removed operatively, and after operation santonin was given and about fifty more ascarids evacuated.

The ascarids here formed a true mechanical obstacle to the passage of the barium just like an enlarged gland or a tumor. There were no signs of mesenteritis.

LARIMORE, JOSEPH W., and FISHER, ARTHUR O. Tuberculosis of the caecum. *Ann. Surg.*, April, 1926, lxxxiii, 496-522.

Intestinal tuberculosis is seen in from 60 to 90 per cent of cases of pulmonary tuberculosis at termination. The intestinal involvement centers at the ileocecal segment, with only rare exception. The clinical picture of intestinal tuberculosis is not conclusive in its early phases. In subjects having no obvious or proven tuberculosis the same picture presents a different differential diagnosis from that of malignancy and of syphilis. An early diagnosis of secondary tuberculosis of the intestine is essential to helpful surgical intervention.

The roentgen picture in secondary intestinal tuberculosis shows alterations in the contour of the intestine, namely, filling defects and spasms and associated disturbances of gastrointestinal motility. The associated direct and reflex derangements of gastrointestinal function as revealed roentgenologically are variable. There appears marked gastric motor delay with gastric hypotonicity, total intestinal hypermotility with complete evacuation of barium in from eighteen to twenty-four hours or with barium in the distal colon or rectum at six hours, in spite of a gastric motor delay, the result of ceco-colic hypermotility. Gastric motility may be almost completely inhibited. The principal sign of ileocecal or ceco-colic tuberculosis is the progressively increasing intolerance of the cecum to any filling material. In the late cases with extensive ulceration, this is readily demonstrated by any test meal or by barium enema and has been the classical sign of ileocecal tuberculosis.

A clinical description is given of 6 cases of early localized ileocecal involvement determined by roentgen study. The other clinical examinations left the diagnosis in doubt. When intestinal involvement has become clinically certain, the pathology has usually advanced beyond the possibility of a surgical removal of the diseased segment of the bowel.



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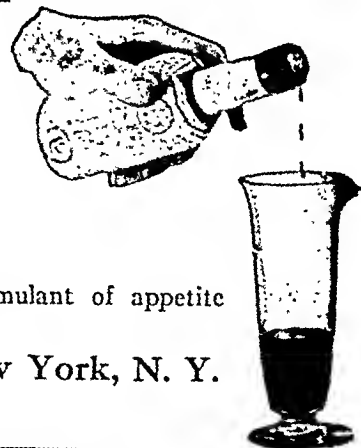
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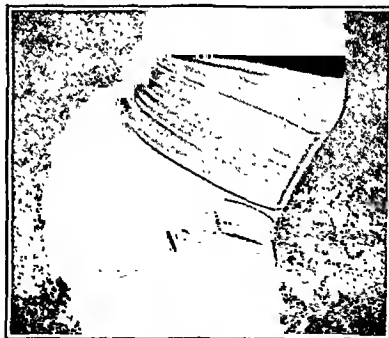
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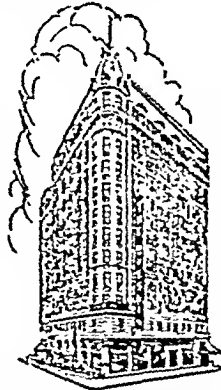


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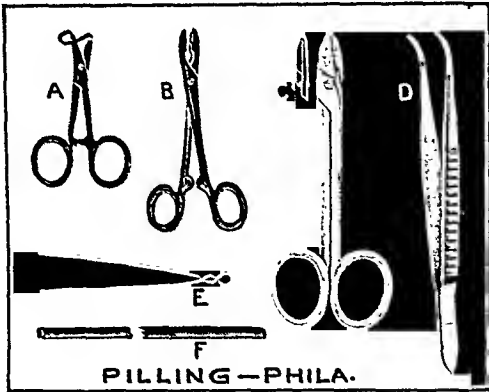
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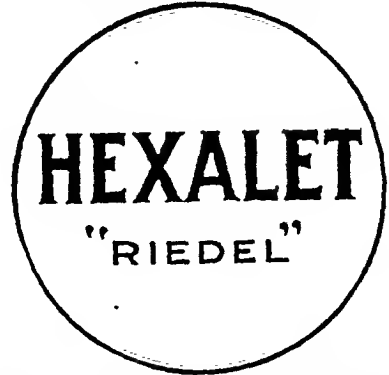
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PFABLER, GEORGE E. The saturation method in roentgen therapy, as applied to deep-seated malignant disease. *Brit. J. Radiol.*, February, 1926, xxxi, 45-58.

The saturation method in roentgen therapy consists in the delivery of an erythema dose into the diseased tissue within a short time, and then maintaining this effect for a certain period by means of additional smaller doses to correspond to the loss in effect during any given period. This loss seems to follow the law of mass action, and may be calculated from the logarithmic law. There is an interval of time during which the tissues recover from a saturation dose and at the end of which this dose may be repeated. It still remains to be determined how long the saturation effect can be safely continued. At present the method must be used with great caution.

WEBSTER, J. H. DOUGLAS. The treatment of fifteen cases of operable carcinoma of the breast by radium and x-rays. *Brit. J. Radiol.*, February, 1926, xxxi, 59-64.

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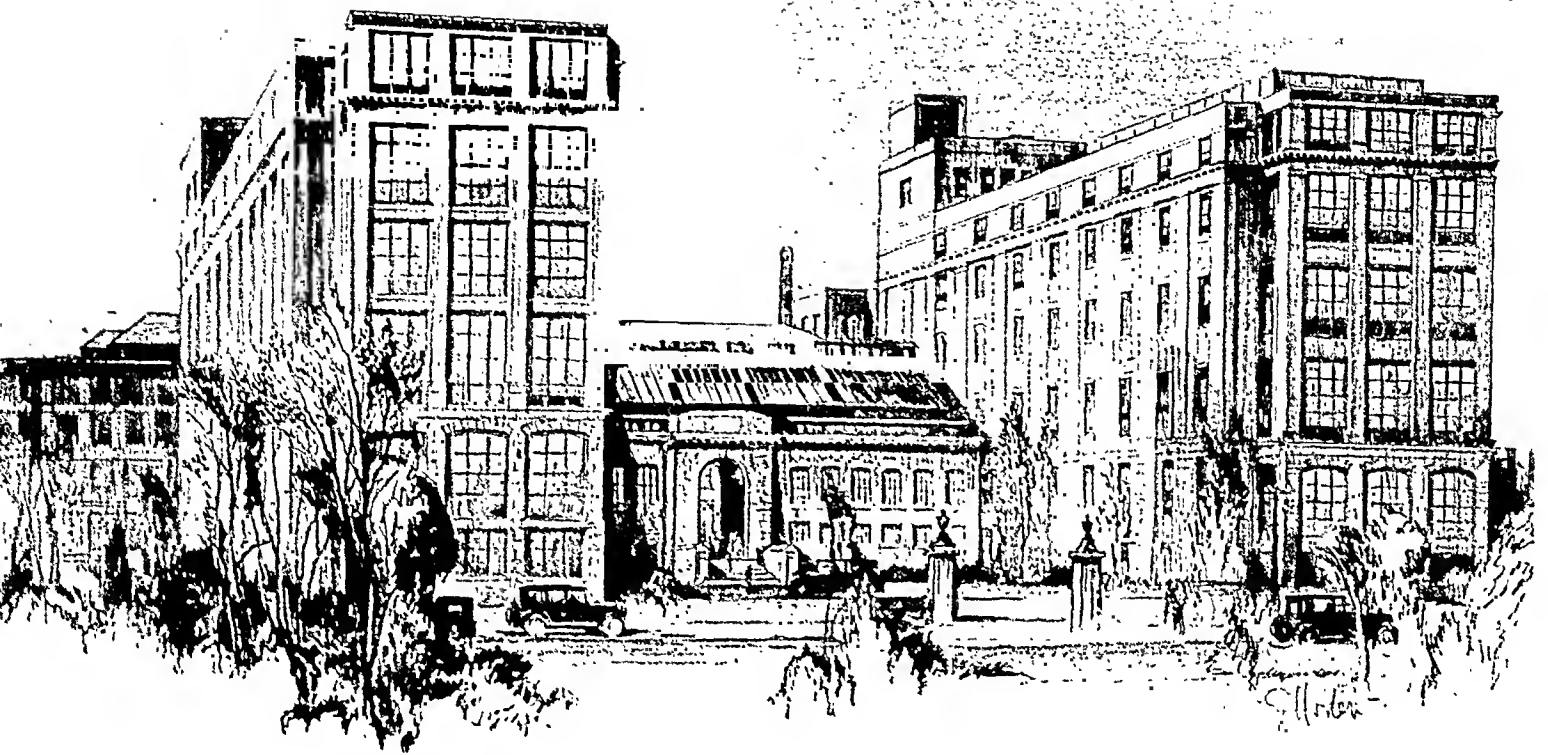
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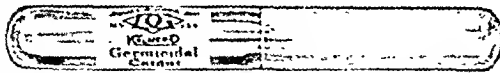


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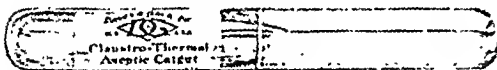
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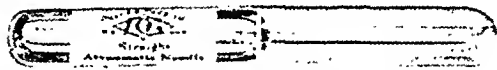
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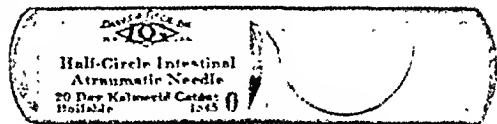
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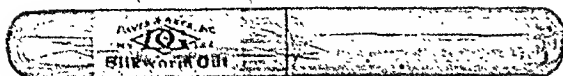
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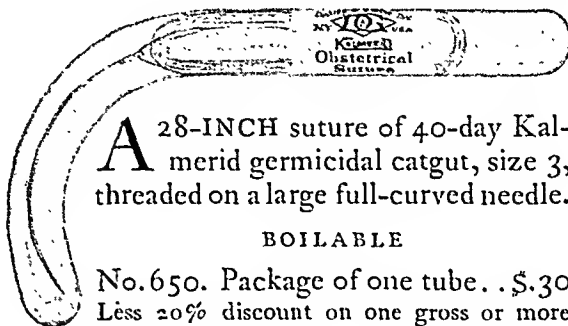
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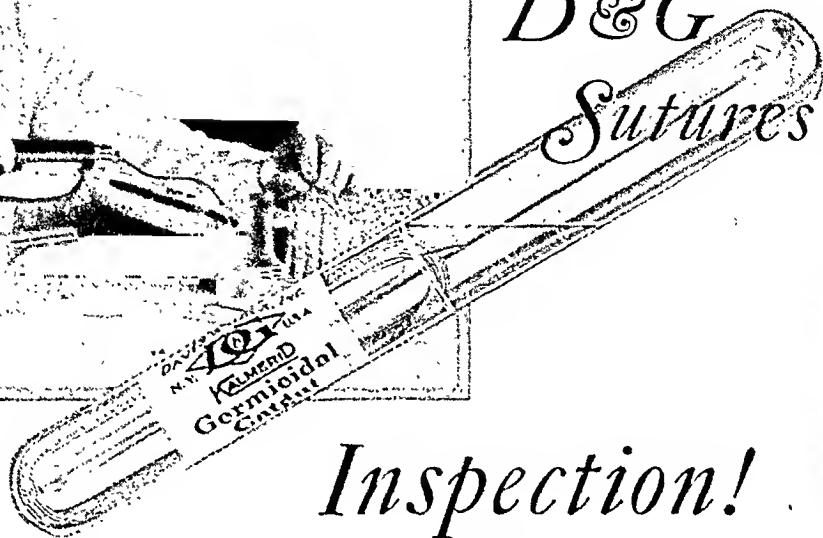
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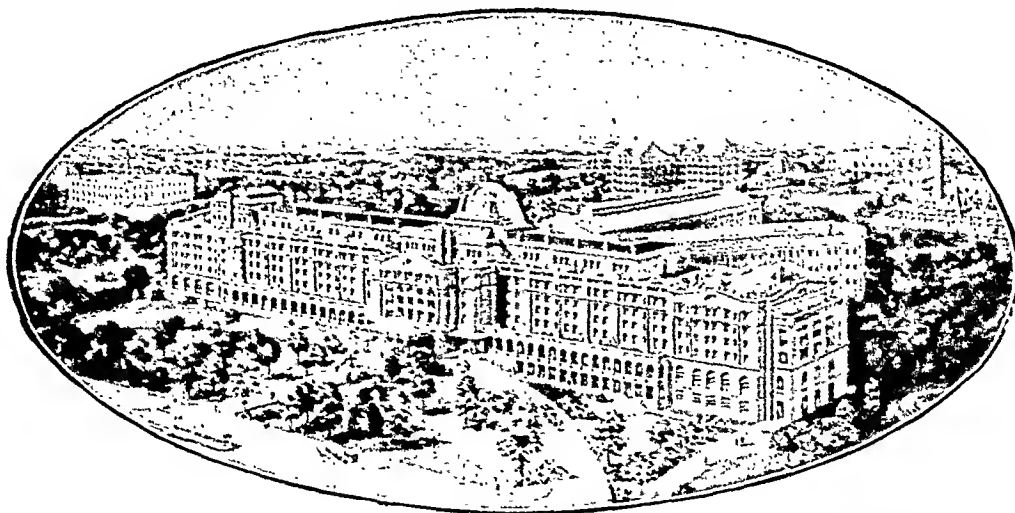
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MACCHIARELLA, BIAGO. Roentgen examination and topographical diagnosis of subphrenic hydropneumocyst on the right side. *Radiol. med.*, July, 1926, xiii, 495-504.

Three cases of intrahepatic hydropneumocyst are described, the first of which followed a suppurated echinococcus cyst, the second was a complication of dysentery and the third followed an echinococcus cyst of the liver that had already been operated upon twice. The author believes that the possibility of an intrahepatic localization of the cyst should be thought of more frequently than it is in subdiaphragmatic cyst. The possibility of an intrahepatic hydropneumocyst should be very strongly considered when in subphrenic cyst on the right side the mobility of the diaphragm is undisturbed, there is no pleural reaction and when on oblique and latero-lateral projections the cyst seems to keep its central position in the liver shadow which moves normally with respiration, leaving the outline of the liver shadow free. If in addition to such roentgen signs there are indirect signs, such as normal mobility of the stomach and intestines, and if there are any clinical and historical data to indicate it a definite diagnosis of intrahepatic cyst may be made.

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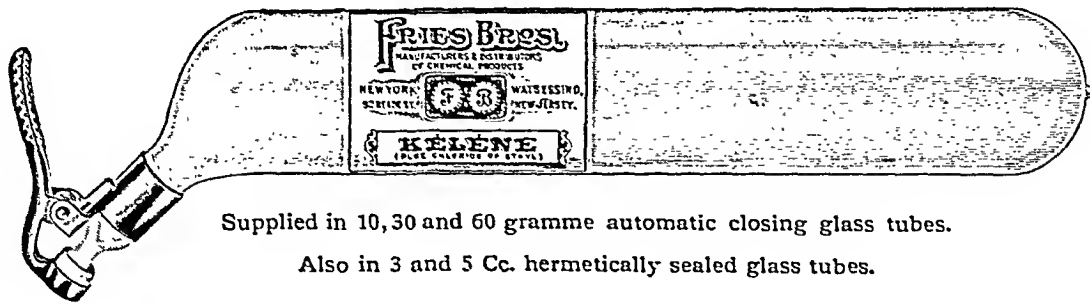
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## THE PLANTAR FASCIA:

### A STUDY OF ITS ANATOMY AND OF ITS PATHOLOGY IN TALIPES CAVUS;

#### A NEW OPERATION FOR ITS CORRECTION\*

J. TORRANCE RUGH, A.B., M.D.

PHILADELPHIA

“WHAT is new is not true and what is true is not new” is an old saying which if literally correct, would practically preclude progress along all lines. Fundamental principles were long ago recognized and recorded by the pioneers in all branches of science and art and in so far as the above epigram concerns these, it is largely correct. However, new applications of these principles occur every day in all professions and especially in the art and science of medicine and surgery. We speak of the classical symptoms and signs of inflammation, disease, direct injury, etc., and find they have remained the same since the earliest observations were made concerning them, but the variations of their application under climatic, geographical, occupational and other limiting and altering influences of modern life are ever changing and really new. For over a century, the plantar fascia has been recognized as an extremely important factor in the development and maintenance of foot deformities, especially those of talipes cavus and varus, though whether as a primary or secondary agent has always been an unsettled question. Practically all writers on the subject of hollow-foot, cavus and claw-foot agree

that a greater or lesser degree of infantile paralysis is the most common underlying factor in the production of the deformity and that certain muscles or groups of muscles on the anterior surface of the leg and the interossei and lumbricales of the foot are the ones chiefly involved in the more severe form, viz., claw-foot.

A distinction should be made between claw-foot, which is the extreme type of pes cavus, and pes arcuatus, the early and therefore a mild form of the deformity. The present paper deals only with the milder forms, which are by far the most common types.

Walsham and Hughes<sup>1</sup> quote Redard to the effect that “the congenital type of cavus may be due to a primitive malformation of the ligaments and bones of the tarsus.” Also that the acquired type “is attributed by Duchenne to paralysis of the inter-osseous and lumbrical muscles and the short flexors and abductor of the great toe.” These authors believe that “the interossei and lumbricales normally dorsi-flex the toes at the first interphalangeal joint and at the same time plantar-

<sup>1</sup> Walsham, W. J., and Hughes, W. K. *The Deformities of the Human Foot, with Their Treatment*. N. Y., 1895.

\* Read before the Section of Orthopedic Surgery, N. Y. Academy of Medicine, January 21, 1927.

flex the toes at the metatarso-phalangeal joint. When these muscles are weakened or paralyzed, their opponents, the long flexors and extensors, throw the toes into the clawed position by plantar flexion at the inter-phalangeal joint and dorsal flexion at the metatarso-phalangeal joint" but they cite four facts against the paralytic involvement of the interossei and lumbricales in these cases:

1. In some cases noted by them, the interossei act well.

2. While these muscles may contract only mildly at first, after corrections of these deformities, they become stronger and stronger, showing that their weakness was due apparently to the opposing force in the sole.

3. These muscles are supplied by the same nerve as supplies the posterior muscles of the leg and would therefore be unlikely to be involved with the anterior muscles. Furthermore that in the event of paralysis, they would scarcely be selected alone among all the muscles supplied by the posterior tibial nerve.

4. The feebleness of interosseus contraction, as compared with that of the long muscles of the foot, is scarcely a factor in the prevention of more frequent formation of this deformity.

Golding-Bird<sup>1</sup> considers that the condition often follows paralysis of the peroneal muscles. This enables the adductors to draw the front of the foot downward and inward and thus permits secondary contraction of the fascia to occur quickly.

Keetley<sup>2</sup> believes cavus arises from trophic changes in the plantar structures, secondary to loss of power in the dorsal flexors of the toes and forefoot, and cites as a parallel or similar condition the changes in the facial structures following paralysis of the facial nerves.

Whitman<sup>3</sup> says a mild form of infantile

<sup>1</sup> Golding-Bird, C. H. *Pes valgus acquisitus. Pes pronatus acquisitus. Pes cavus. Guy's Hosp. Rep.*, Lond., 1883, 3 s., xxvi, 439.

<sup>2</sup> Keetley, C. B. *Orthopaedic Surgery; a Handbook.* Lond., 1900.

<sup>3</sup> Whitman, R. A. *Treatise on Orthopaedic Surgery.* Ed. 7, Phila., 1923.

paralysis or neuritis in early childhood, causing a temporary weakness of the anterior muscles of the leg and thus a toe-drop, is "followed by a secondary contraction of the tissues of the sole and of the muscles of the calf." Some acute infectious process may cause foot or leg weakness which does not become apparent until adult life, when greater strain and weight occur, or it may be caused by gout, neuritis, rheumatism or some form of traumatism to the foot.

Jones and Lovett<sup>4</sup> look upon the condition as due either to the effects of gravity in a paralyzed part or the action of unopposed muscles pulling the two parts of the foot together.

G. G. Davis,<sup>5</sup> in an article on the "Treatment of Hollow-Foot," divided the cases into two great classes, the paralytic and non-paralytic. In each class, the pathology is but poorly understood and obscure.

Of the non-paralytic form, he says that the cause is to be looked for in some irritative factor, probably unsuitable footwear and strain due to excessive use or unsuitable habits or occupation. The condition present certainly consists of a more or less permanent irritation, spasm or contraction of the muscles. As the flexors are stronger than the extensors, we find the foot assuming a position of plantar flexion, also an increase of the plantar arch. He thus looks upon the deformity as primarily muscular and any other changes as purely secondary.

Of the paralytic he says: "The contractions which are present are not active contractions such as we have seen to be characteristic of the irritative or non-paralytic form, but they are passive contractions subsequent on malposition and disuse."

Cochrane<sup>6</sup> considers all types of hollow foot or cavus as different degrees of one

<sup>4</sup> Jones, R., and Lovett, R. W. *Orthopaedic Surgery.* N. Y., 1923.

<sup>5</sup> Davis, G. G. *Treatment of hollow-foot (pes cavus).* *Am. J. Orthop. Surg.*, 1913, xi, 231.

<sup>6</sup> Cochrane, W. A. *Orthopaedic Surgery.* N. Y., 1926.

great class. The causes are muscular imbalance with shortening of the structures on the stronger side (sole). Some are also due to disturbance of innervation as in spina bifida (either patent or occult); others arise from muscle weakness of infantile paralysis or disease of the nerve trunks supplying the dorsal muscles of the foot and leg.

In addition to the above cited causes, Tubby<sup>1</sup> mentions:

1. Multiple neuritis following measles, scarlet fever, cholera and during dentition.
2. Exaggerated action of the peroneus longus.
3. Rheumatism in children and adults, or in those whose parents have suffered from that affection.
4. Too short boots worn by children or young adults.
5. In women, boots too small and with high heels.

Nicoladoni, cited by Walsham and Hughes, "considers that in the presence of paralysis, the plantar muscles were the great factor in drawing the ball and heel of the foot together."

In 1919, my attention became centered upon the plantar fascia as a direct factor in the etiology of these cases through a case reported before the American Orthopedic Association in Rochester, N. Y., and published in the *Transactions* as "A New Method of Correction of Varus and Cavus in Club-Foot." The case reported was a recurrence of the cavus and varus following an old Phelps' operation for congenital equinovarus and the condition was finally cured by removal of the scar and transplantation of a flap of skin, fat and fascia from the calf of the opposite leg. Keetley in 1889 (British Medical Association) described a similar procedure for the same deformity, but turned down a flap from the redundant skin on the dorsum of the foot. The operation was rediscovered in 1895 by T. H. Kellock<sup>2</sup> and

again by Mr. Muirhead Little, and then promptly forgotten by the profession. In 1913, in the London Hospital, I watched Mr. Openshaw remove a very extensive scar from the sole of the foot of a twelve-year-old girl for the relief of a relapsed varus and cavus in congenital clubfoot. Correction was obtained immediately in spite of the fact that the plantar fascia had been removed by another surgeon two years previously for the same condition, but the resultant scar had quickly contracted and the deformity recurred. When I asked Mr. Openshaw what was to prevent the scar from again contracting, he admitted he did not know.

A careful study of these deformities after my operative experience with the Phelps' case showed that they vary greatly both as to degree of contracture and as to the structures involved. In some cases, one finds no evidence of contracture except in the plantar fascia. This is verified by the complete correction of the deformity following thorough wrenching after section of the fascia near its origin. Relapse, however, will take place in these cases if the stretching is not maintained and proper attention is not given to the fitting of the shoes.

Other cases show contracture of the skin as well as the fascia and in these the skin presents a greater obstacle to correction than does the fascia. Such a type is best corrected by a Phelps' incision with a transplant into the cut as reported by Keetley and others or as described by me.

A third type develops contracture of the plantar fascia, skin and subtarsal ligaments. With this type, which is really a more advanced form of the others (as Cochrane has indicated), there is also likely to be found shortening of the plantar flexor muscles which may be due to some inherent changes in the muscle fibers, though more probably it is located in the fascia of the septa and the connective tissue of the muscles themselves. To this type may be gradually added a fourth in which are found changes in the

<sup>1</sup> Tubby, A. H. Deformities, including Diseases of the Bones and Joints. Ed. 2, Lond., 1912.

<sup>2</sup> Kellock, T. H. A modification of Phelps' operation for the relief of talipes equino-varus. *Lancet*, 1895, i, 805.

tarsal bones and their articulations. This form is the true claw-foot and practically all structures are involved in the primary or secondary changes incident to, or causative of the deformity. One naturally sees many more cases of the first and second types than of the third and fourth and the investigation of quite a number of the first degree cases led to a careful study of the plantar fascia to learn why the correction of this deformity is attended with so great difficulty and so many ultimate failures.



FIG. 1. Common type of pes cavus or hollow-foot.

#### ANATOMY OF THE FASCIA

The plantar fascia arises by a broad attachment from the tubercle on the under side of the os calcis and extends forward in the sole to spread out widely and ultimately to lose itself in the deep fascia of the foot and also to send processes to the heads of the metatarsals. Between these processes run the tendons of the plantar flexors of the toes. At about the junction of the posterior and middle thirds, a branch goes off from the inner and upper edge of the fascia and promptly splits into two parts. One of these, of varying breadth and thickness, runs closely under the skin upward toward the front of the ankle joint and there becomes

merged with a similar branch from the annular ligament of the ankle joint. From its anterior edge also, just below and in front of the internal malleolus, arises a broad attachment of the adductor hallucis muscle. The other division of the branch runs directly upward into the foot and is inserted into the astragaloscaphoid ligament. The intimate relationship of both these slips with the various fasciae of the foot and tendon sheaths on the inner side, makes them most important factors in

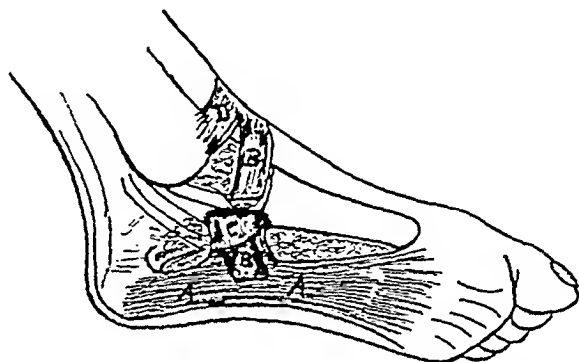


FIG. 2. A. Main body of fascia. B. Branch to annular ligament. C. Branch to astragalo-scapoid ligament. D. Annular ligament.

the shortening on the inner side commonly associated with that in the sole. On the top of the fascia lie the flexor brevis muscles, but except in the posterior portion of the fascia there exists no intimate attachment between the two. (Fig. 2.)

After the fascia is uncovered in the operation to be described later, one may find a variety of changes present. There is always shortening and there is also some thickening. The thickening may be uniform throughout the entire fascia or it may be limited to the outer, middle or inner portions. This is very evident to the eye and according to whether it lies on the inner or the outer portion, the foot will tend to turn in that direction; thus it is apt to prove a determining factor in lateral deviation as well as in shortening of the foot. In practically all cases of the milder form of contracture, after the fascia was removed, the brevis muscles were found

unchanged and the deformity was easily corrected. The question then arose why the fascia should show shortening and the muscles escape if the changes were, as commonly ascribed, secondary to the effects of gravity and the disturbance of muscle balance following infantile paralysis or some congenital interference with, or degenerative loss of nerve function. Accordingly, every fascia removed in a group of 15 cases operated upon was sent to the laboratory for study. These examinations

variously fitted as they are, should be frequently followed by irritation and contraction of the plantar fascia, but it seems never to have been observed, in fact many orthopedic surgeons claim that the pressure of the plate tends more to thin by absorption than to thicken the fascia. Gout and rheumatism are also mentioned as etiological factors, but these conditions are extremely uncommon at the age when the hollow-foot is most common and at which it begins. One must admit, how-



FIG. 3. Incision to expose fascia.

were made in four different laboratories and by different pathologists, but in every case the same report was received, namely, that the tissue showed chronic inflammatory changes of infiltrative type and the picture was that of a typical fibrositis. All parts of the fascia showed this change, but in the thickened portions it was more dense than in the thinner. Thus was given the explanation of the fascial contraction in these cases, making it a primary instead of a secondary factor.

In the endeavor to explain the cause of the fibrositis, a number of conditions offered. Trauma has been mentioned as a factor and while this is admitted in Dupuytren's contraction of the palmar fascia, there is no history of injury in the plantar type of contracture except as will be mentioned later. The common and widespread use of metal arch supports,



FIG. 4. Fascia exposed.

ever, the possible irritative influence of poisons on tissues, since in Dupuytren's contraction, which is a condition of later life, there is commonly a history of some metabolic disturbance of major or minor character in addition to the trauma of function. Practically all writers agree that infantile paralysis of a mild or abortive type is a factor in the causation of this condition and when one thinks of the widespread involvement of tissues in some of these cases and how early and rapidly contraction takes place in those where the infection is severe, one can readily conceive that the degenerative changes in connective and similar tissues may arise from the action of the infec-



tion, whether toxic or bacterial, and regard it as a possible and even a probable cause. Added to this factor may also be the element of trauma from strain on the fascia, where walking and function are resumed soon after the attack.

The possible influence of ischemia, whether through direct interference with the blood supply or through nerve injury (as in Volkmann's contracture) is also to be thought of, but the fact that in none of my cases did the short muscles in

and Hughes in which the dorsal muscles are quite normal in strength but plantar shortening progresses steadily and with it deformity of the toes and tarsal bones.

In reading the directions for treatment given by various writers, one might readily get the impression that the condition was an easy one to overcome, though in a discussion of the condition at a recent meeting of the American Orthopedic Association, all the speakers agreed that treatment was extremely unsatisfactory. Many



FIG. 5. Fascia removed.

the sole show changes renders this condition of but little importance as a causative factor. Whether the examination of the dense tissues or fasciae in other parts of the body in these cases would show evidences of fibrositis, I do not know, but the constant findings in the cases examined are fairly conclusive of a direct relationship between the new tissue formation and the resultant deformity. The paralysis or weakening of the dorsal muscles may and doubtless does aid the progress of the change, even as faulty shoes, faulty walking and other factors cause deformities, but they are adjuvant rather than causative factors. We not infrequently see cases as cited by Walsham



FIG. 6. Fat transplant from side of thigh sewn in place.

different operations have been brought forward for the relief of the hollow-foot and some surgeons claim to be able to cure the earlier cases by means of a steel plate having a transverse elevation on the anterior end to cause the ball of the foot to slide forward in walking and thus promote the stretching of the fascia. One can but wonder what fixes the heel to prevent it from being pulled forward by the muscles and fascia of the sole. It will not be necessary to review the various operative procedures here as they are familiar to the orthopedic surgeon and, as in the case of remedies for rheumatism, the great number indicates that there is no specific and unfailing one.

#### OPERATION

The operation which I wish to describe is founded upon the pathological condi-

tion which underlies the deformity. The contraction of the fascia follows the cellular infiltration plus opposing muscle weakness and faulty position, and so long as this altered tissue is present, the tendency to contraction is constant, even as in any scar tissue which is not kept persistently stretched. If section of the fascia is done, more scar is formed and further contraction occurs. The operative indication is to interrupt the vicious line of contraction by interposing a tissue that will not contract and this is accomplished as follows:

The densest line of contraction in the plantar fascia is easily located by the fingers when the ball of the foot is pressed in dorsiflexion. A longitudinal incision is then made through the skin over this line, from near the posterior attachment to the ball of the foot. The skin and superficial fascia are separated on both sides and the fascia freely uncovered. (Figs. 3 and 4.) This dissection runs well up along the inner side of the foot near the internal malleolus. The fascia is then cut off at both ends and dissected from the muscles beneath. The branch running upward to join the annular ligament is then followed as high as possible and cut off from its attachments. The portion running up under the foot to join the astragaloscaphoid ligament is next followed and cut off from that structure. (Fig. 5.) Pressure is then made under the ball of the foot and the foot may be straightened. If this is not possible, the astragaloscaphoid or deep plantar ligaments may be found shortened and these should be cut or loosed with a periosteal elevator. In most cases this permits correction of the deformity with ease. The wound is packed with gauze and an incision is then made on the outer side of the thigh or the calf of the leg and a flap of fat more or less triangular in shape and large enough completely to cover the denuded area is dissected off. This flap is then spread out in the denuded area in the foot (Fig. 6) and four sutures are

used to keep the flap in place, one in the anterior end, one on the outer side and one in the posterior end, while the fourth is passed through the skin at the highest point of dissection on the inner side of the foot, through the flap and out again through the skin, and is tied over a pledget of gauze. The incision is closed by a continuous suture of No. 0 catgut (Fig. 7), the wound dressed and a plaster cast applied. If there is any shortening of the skin or if it is quite thin, care must be used not to



FIG. 7. Incision closed.

cause too much tension with the cast because of the danger of necrosis of the skin. After a week or ten days, the cast may be cut across the sole and pressure applied by means of wedges to secure greater correction. This is continued until the deformity is entirely overcome. Walking is then begun, in the cast for one or two weeks and then in a flat-soled shoe, and stretching is employed by the patient for the succeeding three to six months.

It may be urged by some that the loss of the plantar fascia may permit a subsequent sagging of the arch of the foot, but

after four years of observation, I have not seen this occur. The scar in the skin will contract if it is not kept stretched, but presents no trouble if walking and stretching are followed out persistently. Tendon transplantation of the dorsal flexors, astragaloscaphoid arthrodesis, or cuneiform osteotomy may be performed in the more severe cases in addition to the fasciectomy.

In the minor cases, they will not be necessary.

The principle of the operation, then, is the removal of the structure that is primarily responsible for the deformity and that is the cause of relapse and the continued progress of the deformity, and its replacement by a tissue (fat) which does not contract.



#### [SURGICAL SUGGESTIONS]

AN "impulse on coughing" without a bulging sac is not a hernia. A large inguinal ring is not a hernia nor a portent of hernia. On the other hand, if a patient is sure that he has seen a hernial protrusion he probably has a hernia even though, as occasionally happens, coughing and straining do not demonstrate it at the time of examination.

IN children, especially, it is often difficult to find an inguinal hernia, even though the parent has seen it. It is usually safe to accept that observation.

BILATERAL inguinal herniae that project on coughing and immediately recede are almost always direct, and frequently contain some of the bladder.

COMPLETE ablation of the sac, by high ligation, is the most important step in an inguinal hernia operation. In children it is usually all that is necessary. It is also important, especially in adults, to close snugly around the cord the stretched transversus fascia—the opening in which constitutes the abdominal ring. In properly selected cases these two steps are sufficient to cure an indirect inguinal hernia without any plastic on the canal.

# THE MEDICAL ASPECTS OF CHRONIC GALL-BLADDER DISEASE

ALBERT F. R. ANDRESEN, M.D., F.A.C.P.

BROOKLYN

WITHIN the last decade we have been through three phases in the consideration of disease of the gall-bladder. At first, it was felt that only gallstones or acute gall-bladder infections could cause symptoms, and therefore the dictum that gall-bladder disease was a surgical condition was established. There followed a period when it was recognized that a large proportion of chronic digestive symptoms are caused by gall-bladder disease other than stones, and the treatment of these conditions quite naturally was delegated to the surgeon. But surgery has not been as successful in the cure of patients with chronic non-calculous disease of the gall bladder, even though the operative technique has been constantly improved. We have therefore entered upon a period in which the reason for the failure of relief of symptoms, even though the gall bladder was removed and frequently found really diseased, has been proved to be due to the fact that the gall-bladder inflammation is only a part of a general chronic infection of the whole gastrointestinal tube and its appendages. Coincident infections of the stomach, duodenum, liver, pancreas, appendix and colon have been almost invariably demonstrated by clinical tests and laboratory and roentgenological findings. The diagnosis of gall-bladder disease therefore becomes of rather minor importance, and the demonstration of its complications is the principal aim of the clinician.

## DIAGNOSIS

The diagnosis of chronic gall-bladder disease is not such a simple matter as the old diagnostic adage "fair, fat and forty with indigestion" would lead us to believe.

While it is true that the greater number of cases are in women past forty, younger persons frequently give definite evidences of having this disease and many men are affected. The symptoms due to the uncomplicated disease of the gall bladder itself are so often masked by those of the other lesions also present that it is difficult to differentiate them. The infected gall bladder, with thickened wall and often distended with concentrated bile, may cause irritation of the duodenum, with which it is in contact, resulting in waves of reverse peristalsis with pylorospasm, which in turn cause fullness or distress after meals, anorexia, heartburn, belching, sour regurgitation and occasionally, vomiting. But most of these symptoms are also those of gastritis, duodenitis and appendicitis, so that only a presumptive diagnosis can be made from them. If gastric or duodenal ulcer is also present, sharper epigastric pains supervene, usually late after meals and relieved by food, although food will continue to produce the fullness or distress caused by the irritation from the efforts of the diseased gall bladder to respond to the stimulation of food in the duodenum. If calculi are present there is often a feeling like a "lump" under the right rib margin or in the back, while the attempted passage of a stone will cause the well-known typical symptoms of biliary colic: severe right upper abdominal pain, reflected to the right scapula and accompanied by vomiting and, if the stone remains impacted for a sufficiently long time in the common duct, icterus.

Various laboratory findings are of aid in establishing a diagnosis of chronic gall-bladder disease, the roentgen ray having for some time been our main reliance.

The direct visualization of stones has been greatly aided by the invention of cholecystography. This consists in the administration, by mouth or intravenously, of 30 to 50 grains of the sodium salt of tetraiodophenolphthalein, which being excreted by the liver exclusively, renders the bile more or less opaque to the roentgen ray due to the presence of the iodine radicle. This method gives us an opportunity to observe the size, shape and mobility of the gall bladder, its ability to be filled by the bile and to expel it, and it renders many non-opaque stones visible by virtue of their being less dense than the surrounding iodized bile. While the observations of the physical characteristics of the gall bladder and of its functional ability are of great interest, it is unwise as yet, especially when using the oral method of administration, to place too much reliance on a diagnosis made exclusively by this method. The older methods of roentgen diagnosis are still available and reliable: the fluoroscopic study of gastric motility showing a prepyloric mass spasm, and of the duodenal cap showing its fixation, the radiographic evidence of a visible, thickened gall bladder, and of a smooth, often cupped-out, and less frequently irregular, deformity of the duodenal cap.

Fractional gastric analysis will show evidences of the attendant gastroduodenal irritation, either a reflex continued type of gastric secretory curve or, in cases of longer duration, an achylia, and the presence of occult blood where the gastroduodenitis is very severe, or visible blood where ulceration has occurred. It may also show the delayed emptying due to pylorospasm.

The examination of the duodenal contents, especially the fractional examination of the bile obtained after the instillation of various substances, especially magnesium sulphate solution, through the duodenal tube, has been held by Lyon and others to be of great diagnostic value. Lyon and his followers claim that by observing the change in color and consist-

ency of the bile as it flows into the duodenum, they can differentiate bile from the common duct ("A bile"), from the gall bladder ("B bile") and from the liver direct ("C bile"). By careful cytological and bacteriological studies of these specimens, especially of the "B" and "C" specimens, they say that a definite diagnosis regarding even the specific infecting organism can be made. Due to the fact that the gall bladder is usually first infected in its deeper layers, with the mucosa often normal even in late stages of gall-bladder disease, it is difficult to see how the Lyon method can be as infallible as claimed, especially when it is realized that there is a constant contamination of the specimens obtained by stomach contents entering the duodenum. My experience with it was very unsatisfactory.

*Complications.* In the complications of chronic gall-bladder disease various other laboratory tests are of value. Where there is a suspicion of partial occlusion of the common duct, a high icterus index (hyperbilirubinemia) will often show latent jaundice a day or two before skin or sclera becomes stained. The van den Bergh test, showing strong reactions for urobilin by the direct and indirect methods (diazo-reaction to plain serum and to serum treated with alcohol and filtered, that is, with albumin removed) will help to differentiate obstructive from hemolytic jaundice where the symptoms are not typical. Clay stools and bilirubinuria are the indications of severe jaundice.

#### TREATMENT

The treatment of chronic gall-bladder disease, as of any chronic infective process in the gastrointestinal tract or in any other part of the body, must consist first of all in the search for and thorough eradication of all possible foci of infection. It is now generally conceded that all chronic gastrointestinal infections are as much due to focal infection as are the chronic arthritides, so that local measures, operative, dietetic or medical, aiming to alter the

pathologic conditions in the gastrointestinal tract alone can be today considered only palliative, just as the salicylates are only palliative in arthritis. Removal of focal infections does not mean simply referring a patient to a dentist or a nose and throat specialist and letting the matter rest, but means insistence upon the extraction of all pulpless or badly pyorrheic teeth, as well as of retained root fragments disclosed by roentgen ray, drainage of alveolar abscesses following extraction, and thorough and repeated scalings in pyorrhea. It means the removal of suspicious tonsils and a careful search for postnasal, sinus or ear infections and their thorough cleaning up or repeated treatment. It means radical care for any infections found in the female pelvis, the male or female genitourinary tracts, the rectum or any other localized infections.

The *treatment of the local condition* in the gall bladder cannot be clearly determined unless there is a thorough understanding of the anatomy and physiology of the gall bladder. It must be understood that embryologically the gall bladder is a budding out from the biliary tract, including liver and pancreas, which have grown from the primitive duodenum also by a process of budding. The gall bladder is a reservoir for bile which cannot enter the duodenum because of the closure of the sphincter muscle of Oddi at the papilla of Vater, this closure taking place when there is no food entering the duodenum, that is, after the completion of digestion of a meal. During its stay in the gall bladder, the bile becomes concentrated, due to absorption of water, and some physiologists claim that the gall bladder adds to the bile a secretion of its own, which exerts a regulatory influence on small intestine motility. Ordinarily the arrival of a meal in the duodenum causes relaxation of the sphincter of Oddi, and there is an expulsion of the concentrated bile into the duodenum when it is most needed for digestion. If the arrival of a meal is too much delayed it can readily be seen that there would be a tendency

to overdistention of the gall bladder and overconcentration of its contents, which, in the event of a persistent closure of the sphincter of Oddi, would result in ineffectual efforts of the gall bladder to empty itself, and would become perceptible to the individual as a distress or pain in the gall-bladder region. In a diseased gall bladder, with thickened walls, even the arrival of a meal makes it difficult for that organ to empty itself, and overdistention from insufficient eating causes more or less severe symptoms, especially when the efforts at emptying may cause a calculus to be pushed into the entrance to the cystic duct, producing colic. It is a fact that most attacks of biliary colic come on after a period of fasting or infrequent feedings, and may or may not follow the taking of the first good meal after such a period. This fact points the way to prevention of gall-bladder symptoms and improvement in the tone of the gall-bladder wall by frequent feedings, and also explains why, after a long period of insufficient feeding, patients will be quite distressed for the first week after beginning this treatment. In the dietetic care it is not necessary to omit any particular kinds of food except meat, which causes distress in practically all infections of the gastrointestinal tract. The diet should be well mixed and may contain a slight excess of fat, it having been demonstrated that while all food elements stimulate gall-bladder emptying (by relaxation of the sphincter of Oddi), fat does it better than any others. Such a diet would be as follows:

Breakfast: Milk, 1 glass

Cereal, 4 oz., with cream and sugar

Egg, one, soft boiled or poached

Bread and butter

Fruit, raw, any kind

Luncheon: Milk, 1 glass

Egg, 1 soft boiled or poached

Potatoes, baked or mashed

Vegetables, well cooked, any kind

Salad

Bread and butter

Desert, pudding, Jello or stewed fruit

Supper: Same as luncheon

Between meals, at bedtime, and in night if awake: 1 glass of milk, and crackers, bread or cake.

Olive oil: 1 tablespoonful 3 times daily with meals.

In case of the coexistence of peptic ulcer, this diet would be a little too rough, and frequent feedings of a smooth diet would take care of the dietetic indications in both conditions. In excessively obese individuals, the caloric value of the diet would have to be cut down by increasing the vegetable and decreasing the cereal constituents. In diabetes the necessary diet for this condition could be divided into six feedings.

*Medication* is usually unnecessary, except in the case of colic, when morphine is of course administered to alleviate the pain. The various cholagogues, such as the saline cathartics, calomel, nitric acid and even the really efficient bile salts, while they may occasion some increase in bile excretion, have been shown clinically and by cholecystographic studies not to exert as much influence on gall-bladder emptying as ordinary food, especially fats and oils. Even in biliary colic, the effect of frequent feedings is to shorten the period of pain and jaundice and to overcome or prevent the disagreeable after effects of the usual starvation treatment.

*Lyon's duodenal biliary drainage* has had its vogue, but is rapidly losing its prestige. Intermittent drainage, consisting of aspiration of duodenal contents, every day or a few times a week, for a period of a few hours after the instillation of magnesium sulphate solution through the duodenal tube, undoubtedly causes the gall bladder to empty itself, but not as quickly or as completely as fat or oils or any other food will produce the same effect. This has been noted clinically and proved by cholecystography. The effect of such a drainage, therefore, may be compared to that of a meal, and in a gall-bladder patient who has usually been starving as a result of the distress caused by food, the beneficial

effect is marked. But the effect of six feedings per day is, as would be expected, much more rapid and marked and produces more lasting results.

Continuous biliary drainage, consisting of thirty-six hour periods of aspiration of duodenal contents combined with duodenal feedings and duodenal lavages, and with intervals of sleep, has more recently been suggested by Lyon as a method designed to overcome the effects of highly theoretical "vicious circles" of reabsorption of poisonous substances expelled by a diseased biliary tract into the duodenum. He removes from three to six gallons of bile during a two to four weeks' treatment. No proof has as yet been presented that these "vicious circles" really exist, that any so-called "toxic substances" are reabsorbed. The removal of such large quantities of bile, especially of the bile salts and pigments, which the biliary tract uses repeatedly in carrying on its digestive function, would seem theoretically to be a procedure that might cause serious damage, and many patients after such treatment appear much depleted. As this treatment can be entirely dispensed with, so far as clinical results in practice are concerned, it is not to be recommended.

*Surgical treatment* should be confined to cases in which complications not possibly affected by medical treatment require operative procedure for their removal or alleviation. Less than 10 per cent of all cases of chronic gall-bladder disease will fall into this group. Except in surgical emergencies, operation, even if definitely decided upon, should be deferred, if possible, until dietetic treatment has been carried out and all focal infections have been removed. Such a course, if followed in every case, will prevent many of the unpleasant immediate and later postoperative complications, will reduce operative mortality to a minimum, and will often occasion such marked improvement in the patient's condition that the necessity for operation may be obviated. The complications often necessitating operation include



the presence of calculi, adhesions or cicatricial deformities of the gall bladder, producing persistent symptoms. If no symptoms are present that could be attributed to the presence of these complications, operation is not to be considered.

It must be remembered that "silent" gallstones are very prevalent, and if proper non-surgical treatment will put a case of gallstones in the "silent" class, it is best to act as if gallstones had never been discovered. The only argument in favor of removal of "silent stone" gall bladders is that carcinoma may develop, but it has never been shown that the percentage of occurrence of malignant change in calculous cases exceeds or even equals the mortality from operation.

In the cases with symptoms caused by deformities resulting from pericholecystic or periduodenal adhesions or cicatricial contraction, the necessary plastic operations are so difficult and so uncertain in their results that they should be performed only as a last resort. Chronic pancreatitis, probably a very frequent if not invariable accompaniment of biliary tract disease, usually clears up with the latter, but complications such as calculi may require operation.

*Postoperative treatment* is very important. With the removal of the gall bladder, the physiology of digestion has been modified. There is no concentrating reservoir for the bile which cannot enter the duodenum between meals when the sphinc-

ter of Oddi is closed. The accumulating bile must back up into the liver or dilate the common duct or the stump of the cystic duct. The dilated cystic duct may eventually take over at least the motor function of the gall bladder, but will probably never be able to concentrate the bile. During the development of this dilated stump into a functioning bladder, overdistention, with its consequent train of post-operative reflex digestive symptoms, must be avoided by producing frequent Oddi sphincter relaxation and biliary tract emptying. This is best accomplished by means of the frequent feedings before described. At least six months or a year of careful dietetic treatment after operation will prevent many disagreeable after-effects. Any recurrent or persistent focal infections will cause inflammatory complications and should be constantly watched for and thoroughly eradicated when discovered.

#### SUMMARY

1. The diagnosis of chronic gall-bladder disease is based on the history, the roentgenographic findings and some laboratory findings.
2. The treatment is essentially medical, and consists of dietetic stimulation of biliary drainage and removal of focal infections.
3. Surgical treatment is to be confined to the complications of the gall-bladder disease.
4. Postoperative treatment is important.



# THE INTERNIST'S PROBLEM IN ANESTHESIA\*

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DOCTORS and laymen generally link surgeons and anesthetists together and seldom associate an internist with a surgical operation. Until recent years this association was quite natural, as all surgical procedures were "operations of necessity," that is, undertaken only when there was a distinct hazard to life unless some intervention was carried out. However, conditions are rapidly changing and at the present time, when great advances in skill and improvement in mechanical devices have made surgery safer and surer, and the studies of chemists and anesthetists have refined the various means of abolishing consciousness of pain in connection with it, many operations are performed daily when conditions are not such as to threaten existence, the object being to improve health, to add to the enjoyment of life and to prevent a real emergency operation at a later date. In fact, today there are probably more operations performed that are optional than that are compulsory.

In an emergency, a life-and-death condition, there may be no place for the internist, but in all operations of election there are ample time and opportunity to place the patient in the best possible condition to withstand the ordeal. In this there is definite work for the internist and there should be complete cooperation on his part with the surgeon and the anesthetist. The surgeon and the anesthetist must accept conditions as they find them; the internist can, in a large measure, shape conditions to meet the needs of the special occasion. Although he cannot make a hemophiliac or a lymphatic subject into a desirable surgical risk, his superior opportunities

enable him to recognize these unfortunates in the beginning and to decide how, if at all, it will be possible for such subjects to undergo an operation.

The physician who refers a patient for a surgical operation requiring an anesthetic must be concerned as vitally in the kind of anesthesia employed and the competency of the anesthetist as in the qualifications of the surgeon who is to perform the operation.

Responsibility for the patient, who in the final analysis is the one most concerned, renders it essential that internists, who fully appreciate the safety of their surgical patients, should familiarize themselves with the patient's general condition and should have practical knowledge of the principal anesthetic agents and the ability and experience of the anesthetist. Especially is he concerned with the effects of anesthesia, for it is here that more risk and uncertainty usually exists than in the operation itself. "Surgical shock" is still an ill-defined entity and just how much of it is due to operative trauma and how much to the effect of anesthesia we are not as yet certain. However, the metabolic disturbances that follow operations have been studied and evaluated, so that we are today in possession of a wealth of information which is of help in placing a patient in a condition that will offset the many disadvantages imposed upon him and enable him to pass through the ordeal triumphantly.

Most of the drugs employed for the production of general anesthesia, if used in high concentration or for a sufficiently prolonged time, produce a toxic effect which is the more serious if the organs are more

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or less damaged and are unable to offer normal resistance to this toxic effect. The internist who is familiar with the history of the patient and who has had him under personal observation is the one qualified to judge whether his condition warrants the use of a general anesthetic, or whether local or regional anesthesia alone is indicated; further, whether the use of a particular anesthetic drug is contraindicated or not and of the precautions that are necessary during the anesthesia. These are matters on which the safety of a patient depends during the ordeal of an operation and after it. Insufficient attention is given to them and I think that it is safe to say that probably not more than one-third of the patients operated upon in the hospitals of the United States receive the protection that a searching preliminary examination by a competent internist accords. While such an examination is admitted in principle as absolutely necessary, it is very often slurred over or omitted in practice; and the fitness of a patient to be submitted to general narcosis, as well as his observation during its course, is frequently left to one who has had little, if any, practical experience in administering anesthetics.

A rigid examination of all patients will show about one-third to be poor surgical risks, and the results of haphazardly operating under such conditions is one of the reasons for the old saying that "the operation was a success but the patient died."

The preparation of a patient to receive an anesthetic for a surgical operation is in reality more important than the post-operative care, for if there has been ideal preoperative attention, there will be little need for postoperative management. In addition to the comfort of the patient in the postoperative days and to his general health during and following convalescence, there is an economic problem to be considered, viz., the number of days in the hospital. It is an investment for the patient, and not an expense, for him to be put into the best possible condition before any surgical procedure and to have the

anesthetic administered in a skilful manner as can be done only by the expert anesthetist, for these will reduce his hospital days and nursing hours. Many people, and most surgeons, think it is sufficient that the patient recovers from the operation, and scant attention is given to how long it takes to return to normal or what degree of comfort is experienced during this time. Everything is judged by comparison. Few patients have had a previous operative experience and if they are weeks in recovering normal health they believe it was due to the serious condition they were in. They do not appreciate the fact that many details in their particular cases were overlooked.

#### GENERAL EFFECTS OF NARCOSIS

In considering the general effects of narcosis, we must remember that as yet there is no ideal anesthetic agent. No method of producing anesthesia is free from danger; this danger may be greater with one patient than with another and may be greater with one operation than with another. This danger may be greater or less with the same patient at different times and with different conditions according to the fluctuation of his own health. Deep narcosis may be considered as always producing more or less damage to the lungs, bronchi, kidneys, liver, etc., although such effects may not always be clinically evident. Naturally, if these organs are already damaged, or if the patient has a generally poor resistance, or if his system is already overloaded with toxins, the effects will be more severe. It is reasonable to assume that there is some pathological process present in the various organs of the body from the fact that there is a condition present which requires operative measures. It is rapidly coming to be recognized by the discriminating members of the profession that complications and death following surgical operations are due less to the mechanical surgical manipulations than to preoperative failure to recognize the unfitness of the patient or to prepare him

properly to undergo the surgical and anesthesia risk.

Patients surely have the right to expect that every aid which the internist can furnish them for the ordeal, and even his presence, if necessary, during the operation should be given. They also have the right to expect that the anesthetic will be given by one fully qualified and experienced in this important department. In fact, the anesthetist has a broader function than is usually ascribed to him and he should, in many cases, be in a consulting capacity even to the point of making a decision that an operation should be recommended and at what time. In doubtful cases it is our custom to have the judgment of the anesthetist before deciding upon operative measures.

#### NON-SURGICAL CONDITIONS AFFECTED BY ANESTHESIA

It is more important to consult the internist today than in the past, owing to the fact that in the early days surgeons were all physicians who added surgery to their previous experience in general medicine, whereas today most of the surgeons lack this general medical experience. The training the surgeons receive today causes them to become skilful operators and by the very perfection of this surgical technique they are deprived of the opportunity of prolonged observation of any particular patient. Also the early surgeons were, as a rule, well acquainted with their patients and knew their peculiarities, whereas today many surgeons are operating only on case "XYZ." The operation is, in many cases, routine and as we all know that constant repetition makes for perfection, the surgeon who has performed a thousand appendectomies should have perfection of their surgical technique, but this does not tend to broaden the surgeon's view and understanding of the individual case. Our present system of training practically makes it impossible for the surgeon to acquire judgment regarding the non-surgical phases, which can be considered only after

prolonged observation. He cannot be expected to be keenly alert to the non-surgical factors which may be equally important in obtaining results for the patient.

In many conditions, it is far more important that the anesthetist look to the internist than to the surgeon, for the internist has studied the patient as few surgeons will do and the diagnostician owes his patient a certain service after a decision has been made to operate. There should be a constant understanding between the internist, anesthetist and surgeon and the patient should be made to feel that all are "on the job." The internist has to consider many problems presented by the patient and he must constantly be alert to those that will confront his colleagues.

Let us consider some of the conditions most frequently affected by general anesthetics. Ether is likely to aggravate existing pulmonary defects, but the acuteness of the lung condition is far more important than the extent of the involvement. Chloroform aggravates kidney and liver defects and produces pathological conditions in them.

The history of a patient in regard to these organs and their functional value should be accurately known before he is submitted to the effects of these narcotics. Diabetics and alcoholics are quite apt to develop acapnia and cyanosis during anesthesia. These and similar conditions are not given sufficient attention when a patient is rushed to an operation.

*Acidosis.* The usual anesthetic drugs tend to produce acidosis. As Carey<sup>1</sup> remarks, anesthesia usually means anoxemia, insufficient oxidation, increased acidity and acidosis. Impaired kidney functioning, chronic infections, in fact all diseases that drain the body of alkali reserve are factors which in prolonged anesthesia induce symptoms of acidosis, which is found to occur in from 15 to 20 per cent of surgical operations. The post-operative condition of the patient corresponds in general with the condition of the patient before anesthesia.

*Liver Conditions.* The particular effects of ether and chloroform on the liver must be kept in mind. Although it is generally known that permanent damage to the liver and cholemia are produced by chloroform (especially in the presence of abdominal disease, as shown by Reichel<sup>2</sup> and Vorschütz<sup>3</sup>) yet it is not generally known that ether may produce similar effects. In 1910 Rathery and Saison<sup>4</sup> showed experimentally that hepatic and renal lesions produced by the use of ether were as frequent and probably as severe as those caused by chloroform and that the histological lesions were similar. It is not necessary here to enter into a discussion of how cholemia is produced, but only to remark that it seems most probably to be due to the anesthetic and is not, as stated by some, a postoperative effect. The point is stressed that a healthy liver and healthy kidneys are necessary to eliminate the increased acids produced in the body during narcosis and that if the patient is showing signs of hyperacidity before operation the postoperative acidosis is more certain to occur. For a number of years it has been known that the administration of an anesthetic, even to a perfectly normal individual, is followed by "small but very definite changes in metabolism."<sup>5</sup> It has likewise been established by Crile<sup>6</sup> "that nitrous oxide, ether and chloroform during their administration all produce increased acidity of the blood" and also "that the acidity of the urine is increased markedly under ether and chloroform—less under nitrous oxide."

*Cardiorenal Condition.* The cardiorenal case requires special attention before being submitted to the risk of narcosis. The more uncertain hearts from an anesthesia standpoint are those having a profound myocardial change such as occurs in long-continued toxic infections. The main question to answer is as to the tone of the heart muscle. This is much more indicative than heart murmurs or slight irregularities, as it is most important to know what reaction the heart muscle of an individual patient will be when subjected to extra strain.

Owing to the fact that the severe post-

operative complications in cases showing cardiac or renal defects can mar the most brilliant surgery, it is a matter of extreme importance for the patient that, when time allows, he should be subjected to prolonged observation and all necessary examinations and laboratory aids before operation, and, furthermore, that the medical means of improving the patient and correcting defects should be applied.

*Obesity.* The patient who suffers from obesity must always be considered a poor subject for anesthesia. The mere fact that he is obese tells us that there is faulty metabolism and we know a condition of anoxemia exists. Giving such patients only a restricted diet to follow will not correct the condition as it does not reach the cause; in fact, all short-cuts for reducing, such as the various diet fads and the use of reducing drugs, can only be condemned, for they are harmful to the patient. The fair, fat and flabby patient is in this condition as a result of lack of exercise, improper breathing and overindulgence in food evidenced in glandular dysfunction. It is far better to permit the patient to eat with appropriate dietary control than to change to a starvation diet. It is important that the patient receives proper direction in regard to exercise and breathing in addition to restricting the food intake. The obese patient is daily carrying excess baggage and has not the desire to exercise. Not only are the skeletal muscles of the body abnormal in the obese subject, but the heart muscle is likewise involved. Such a patient has not only a fat body, but in time, owing to the faulty circulation, he has what may be known as a "fat head". It is difficult to secure cooperation from such a person. The weight of the patient should not be considered so much as his physical condition; and following the various fads to reduce weight will not place the patient in a better condition for an anesthetic. Proper nourishing food, regulated exercise and sufficient oxidation are more essential to the fat person than to the lean; and, to repeat, starvation methods and the use of drugs for reducing can only be condemned.

**Age.** The age of the subject has an important bearing upon the condition induced by anesthesia, for when old animals were used in laboratory experiments it was found that ether was much more toxic for them than for the younger subject, for "the old organism has an acid-base balance of the blood which is not stable, and can be readily reduced by the use of such an anesthetic substance. When such a reduction has been effected in the reserve alkali of the blood of such animals there develops a reduction in urine formation or the establishment of an anuria. The urine contains albumin and casts and, more rarely, diacetic acid. The elimination of phenolsulphonephthalein is greatly reduced or present in the urine as an indeterminate trace." The "toxicity is first expressed by the anesthetic substance inducing such a change in the physico-chemical state of the blood that one organ at least, the kidney, is furnished blood of such altered composition that it fails to functionate in a normal fashion. It would appear that, prior to the use of an anesthetic in an aged person, the organs should be protected against the anesthetic by the use of a diet rich in carbohydrates, and by the judicious use of medical measures, in order to maintain during the anesthesia a normal acid-base equilibrium of the blood."<sup>7</sup>

#### EXAMINATIONS

The casual routine and standardized examinations and tests applied by inexperienced hospital interns are in no way sufficient. It is very little credit to medical science generally that the patient should undergo the trying, expensive and dangerous ordeal of surgery only to exchange one miserable state of existence for another that may even be worse. In the preoperative study of the patient, it is not only necessary to know the functional ability of the heart, the kidneys and the liver, but attention must be given to every detail that will give information as to the individual's general condition. In making these observations the internist should be considered remiss if he fail to employ every

possible method of precision, for the guess-work that has all too often marked such examination in the past can now largely be eliminated. Much attention is now being given to the blood pressure, which should be ascertained under varying conditions, and to the state of the blood vessels. This is essential, but there is danger that in placing too much importance on this particular aspect of the case, others of no less importance may be overlooked. Anyone with sclerosed arteries is a poor subject for anesthesia, but this danger is more generally recognized than others. It is not always the patient with a hypertension who is a dangerous anesthesia risk. The patient with too low blood pressure is many times a greater risk. The important question is the pulse pressure and how the patient's pressure will react under an anesthetic.

**Breath-holding Test.** More than a dozen years ago Yandell Henderson<sup>8</sup> of Yale suggested a simple breath-holding test that is one of the simplest tests to use yet is seldom employed. This test is an excellent index of the functional ability of the heart and kidneys. One of the most striking facts deduced from the study of the breath-holding test is that one-third of the postoperative deaths occurred in those patients whose powers of respiratory suspension were subnormal and it was observed that the hazards of anesthetization were greater as the power to hold the breath became poorer.

Gilbert Fitz-Patrick<sup>9</sup> in 1922 reported a series of 8-1 obstetrical cases in which he employed the respiratory suspension tests and carefully demonstrated the importance of this simple procedure. I now employ the test as much as a routine measure as taking the blood pressure and I consider it one of the most valuable indications of the patient's condition. I will not advise an operation if the patient cannot hold his breath at least fifteen seconds. In such a case, it is necessary to hunt for the cause and to correct it.

**Urinalysis.** A patient may show acidosis without acetone in the urine, or aceto-

nuria may exist without acidosis. If he is already suffering from malnutrition or pathological conditions existing in the lower alimentary tract, such as will induce catabolism of fat and carbohydrates, acidosis is likely to be present. Mere traces of acetone need not arouse anxiety, but if it is present in noticeable quantities, it is certain that the administration of any anesthetic will lessen hematogenous alkalinity and produce overwhelming intoxication.

Continued routine urinalysis is essential.<sup>10</sup> The perfunctory examination of a single specimen or of urine collected in hospital vessels is of negligible value. A report of the presence of acetone or diacetic acid must always be investigated, since many drugs, such as acetanilid, aspirin and migraine remedies taken by laymen as the result of promiscuous advertising, will cause reactions simulating those in delicate color tests. It is absolutely essential to *exclude the taking of drugs* if the examination of the urine is to give information of value.

The careful study of a properly collected twenty-four hour specimen of urine is most important for all prospective operative patients. Clifford Mitchell<sup>11</sup> has described in detail the collection and examinations of the twenty-four hour urine specimen. When the collection is concentrated, which can be obtained only by limiting the intake of fluids, and is preserved so as to prevent decomposition (refrigeration is the only ideal way to preserve it) we know from experience that reliable information is obtained that may warn us before other manifestations that the patient is in an abnormal state and that conditions must be corrected.

#### THE PERSONAL EQUATION

There remains to be considered that intangible but nevertheless highly important factor in the success or failure of any surgical procedure, viz., the personal equation, which is so often overlooked, especially in institutional work. The "professional manner" of the anesthetist has been dealt with often and at great length and

systems have been worked out to take care of the psychic element which, if not sufficiently considered, may nullify all our labors. It remains, however, for the internist who is intrusted with the pre-operative preparation to see that the patient is in that frame of mind where he will approach the anesthetist with the serenity and calmness so essential to satisfactory results and will take the anesthetic without fear or excitement. For the accomplishment of this the internist's personal equation is quite as important as the patient's and there is no part of his by no means easy task that offers more opportunity for individual expression and true professional skill.

#### CASE REPORT

One case will illustrate how a poor surgical risk patient can be placed in such a condition that he can be classed as a good risk:

In May, 1923, a woman fifty years of age was referred for a diagnostic study. She had been under the care of many different physicians and, although an invalid for years, little attention had been given her except drugging by doctors and manipulations by drugless healers. The diagnostic study revealed a chronic cholecystitis and cholelithiasis, but it was far more important to consider the general condition of the patient than the fact that gall-bladder disease and stones were present. She was generally exhausted and although no true jaundice was present, she looked like "putty." Respiratory suspension was only ten seconds. The heart tones were without force. The pulse pressure was less than 20 mm. Hg. The urine examination showed a marked kidney disturbance and the blood chemistry findings showed a carbohydrate intolerance. The acidity was 70° and the pH. was 5.2. This patient gave a history of "blinding headaches" for years and was unknowingly an aspirin addict. She had also had many acute attacks of neuritis and acute gall-bladder colic for which doctors had repeatedly given opiates to relieve the pain, but the drugs added to the general toxic state. Also she had been a constant user of cathartics.

She was placed in training for an operation and from the beginning I realized that I did not have just a condition to meet but a problem to solve. The result was not obtained by drugs,



but by management. It was not obtained in a day or a week, but when the patient appeared in the operating room, she was not a poor risk patient and her hospital days were even less than the average. Of course, appropriate dietary methods were employed. The patient's elimination was improved by scientific massage and systematic, graduated exercise was instituted. By massage, rubbing is not referred to and by exercise I do not mean motion. Exercise must include mental activity as well as physical. Housewives may do a large amount of labor in a day, but it is in many instances only routine drudgery and is in no sense exercise. This patient was taught how to breathe and it was seen that she did increase her oxygen intake. In the beginning the passive resistant exercises were employed and, later, walking with deep breathing and instructing her to hold her breath and to count the number of steps she could take while holding her breath. With the improvement from following the dietary rules, the increased oxidation, the increased cell elimination and the return to normal of the acid-alkaline balance, the necessity for the use of drugs disappeared. When it was decided to operate, the patient's pulse pressure was 40 mm. Hg.; the respiratory suspension was 45 seconds; the twenty-four hour collection of urine showed a normal acidity with all indicators; indican was slight and there was no sugar or albumin present; likewise the small granular casts and red cells had disappeared. The blood chemistry findings were also close to normal standards. This patient's operation in August, 1923, confirmed the diagnosis. She made an uneventful recovery and had a minimum of postoperative discomfort, leaving the hospital on the fifteenth day. This was more than three years ago; and she continues to enjoy better health than for many years and she is an active and useful member of society.

#### SUMMARY

The gist of what I have endeavored to say is that, owing to the many complications that may result from anesthesia, it is imperative that every patient who is to be submitted to it should have a thorough preoperative examination and preparation by the internist referring the patient or else by a responsible internist in the hospital. It should not suffice that the patient be left to the casual tests of the anesthetist a few

minutes before the operation commences. There should be complete cooperation between the internist and the anesthetist as to the advisability of subjecting the patient to anesthesia just as there should be complete cooperation between the internist and the surgeon as to the necessity of the operation, the preoperative care and the postoperative management.

The internist must not only possess himself of the patient's confidence; he must extend that confidence to include the other practitioners who are to minister to the patient. It is his tact, his patience and his interest in the results to be secured by the patient that are vital. To accomplish all this is not easy, and to many it may be impossible. Yet this is the heart of the internist's problem, and to its solution he must bring all his best resources if success is to crown not only his own efforts but those of his colleagues, the surgeon and the anesthetist.

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# THE PRESENT VALUE OF DIATHERMY IN UROGENI- TAL DISEASES\*

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I HAVE chosen this subject for two reasons. In the first place, I believe that we are all interested, in some measure at least, in the various uses of diathermy in urological work. In the second place, the great enthusiasm that this relatively new form of therapy has aroused in recent years, its rapid development and the frequency with which new uses are being found for it make it expedient, in my opinion, to pause occasionally to review the subject and make certain that all our efforts are fully justified on the bases of fact and general experience. It is my desire merely to discuss the present status of diathermy as it applies to a particular field.

The use of physical forces in the treatment of disease has created an important branch of medical practice that has grown strikingly in the past decade, and that bids fair to assume still greater proportions as time goes on. Certainly when we consider the number of our specifics in the long list of galenicals and chemical medicaments, it is not difficult to believe that physical agents may offer in increasing numbers new and effective means of combating non-surgical affections. By physical agents I refer, of course, chiefly to radium, roentgen ray, ultraviolet light, and electric energy as now employed in diathermy. Surely for the urologist the importance of these forces has grown very rapidly. We could ill afford to spare radium and the roentgen rays; and we have been fast in finding new value in diathermy both as a method of therapy in itself and as an adjunct to surgery in the treatment of malignant disease.

## DEVELOPMENT OF USE OF HIGH FREQUENCY CURRENT

The use of high frequency current "for the production of thermal effects in the depths of tissues," as Zimmern has well defined it, has developed surprisingly since D'Arsonval, Elihu Thompson and Tesla (1889-1891) first demonstrated that such current could be safely passed through the human body with the resulting production of heat, and without the trauma and muscle-nerve stimulation attendant upon the use of ordinary galvanic or faradic current. Indeed, the uses and the suggested uses of diathermy have been so multiplied in the past few years that there is danger, unless we are cautious, of permitting enthusiasm to run ahead of fact. Progress, to be sure, comes with acceptance of the new, but the mere newness of the method alone does not warrant its acceptance. It is true, of course, that diathermy deserves a definite place in our list of therapeutic measures, and I believe that its importance is destined to become greater; but I do not believe that we should sponsor every claim concerning it, or attempt to define its usefulness with any degree of finality until we have more of actual knowledge concerning its benefits and its limitations. In certain conditions its efficacy has been well demonstrated; in others we must still reserve judgment. It is a potent weapon capable of harm as well as good, and if we are to use it safely and to the point of its maximum effectiveness, there is much that must still be learned about it. I fear that in the case of diathermy we have too often

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and to too great an extent been using the medicine without clearly knowing the amount prescribed, its path through the body, the safe limits of dosage, or even its exact identity in the tissues. I wish by no means to imply that the medicine is not good, but rather to urge that we must answer certain fundamental questions before we can fairly expect to use it to its greatest advantage.

#### DOSAGE CONTROL

When we are using heat, for example, through diathermy, just how much heat is being generated in the tissues under treatment? In other words, what is the dose? Inaccuracy of dosage until recently has been the greatest lack in this form of therapy and the greatest obstacle to its sound progress. Dosage has been spoken of generally in terms of amperage, which really denotes nothing but the amount of current delivered by the particular apparatus in question. Amperage in no way denotes temperature. The degree of heat developed in the tissues depends rather upon a variety of additional factors, such as the varying resistance offered by the tissues between the electrodes, the loss of heat by convection through the efficient cooling mechanism of the blood, the size and position of the electrodes, and the length of the exposure. This offers a complicated problem, but it is heat nevertheless that we are using, and heat, therefore, that we must learn to measure if we are to treat the lesion accurately, and at the same time protect with certainty normal structures. The results produced in the given case will always be the product of just two factors: the degree of heat developed at the site of the disease, and the length of the exposure.

Definite progress, I am glad to say, is now being made with reference to this most fundamental problem in diathermy, the measurement of dosage. There have been devised various types of active electrodes that hold thermometers, thus giving

an approximate idea, at least, of the temperature developed during the course of the treatment. While this is a very distinct advance as compared with previous methods in which sole dependence was placed upon the finger of the operator or the sensations of the patient, it is not ideal, for at best such electrodes can inform us only concerning the degree of heat within the instrument itself. When it is remembered further that in diathermy the rise of temperature is produced within the body tissues and that such an instrument must receive its heat from those tissues, the lag in temperature-recording and the error involved become obvious. It is knowledge of the degree of heat within the body, at the site of the lesion, that we must hope to obtain.

A solution of this problem has been offered, I believe, by Professor Bovie of Harvard, in the form of minute thermal junctions embedded in the points of hypodermic needles, or embodied in the tips of the active electrodes. These thermal junctions may be applied at will, to the surface or depths of the tissue to be treated, and will record constantly, and with greater accuracy than a thermometer can be capable of, the temperature developed in the area in question during the whole procedure. The record is read, of course, upon a microgalvanometer, which has been especially calibrated for the purpose, in terms of units of heat instead of units of electricity.

This method, which we have called "controlled diathermy," has already been described in a recent publication by Bovie, Cunningham and myself,<sup>1</sup> in which we especially suggested its usefulness, combined with surgery, in the treatment of malignant tumors of the urinary bladder. Here, as is well known, there is urgent need, in the use of diathermy, to know with certainty that sufficient heat has been engendered to destroy the growth

<sup>1</sup> Bovie, W. T., Cunningham, J. H., and Graves, R. C. Controlled diathermy; new method for treatment of bladder tumors. *J. Urology*, 1925, xiv, 411-418.

and at the same time to know with equal certainty that normal tissues and vital structures are not being damaged beyond the point of recovery. We suggested for this particular purpose, therefore, a series of multiple thermal junctions placed in the tips of needles, which may be implanted around the periphery of the growth as outposts protecting against the too great spread of heat. We use, in addition, vaginal and rectal bougies containing thermal couples anteriorly placed, for the safeguarding of these organs against trauma in the destruction of those tumors that involve the bladder floor.

This principle of controlled diathermy is applicable, of course, to every field in which diathermy is used, medically or surgically, and I believe that Bovie's method in some form will be embodied in the diathermy apparatus of the future. Certainly it offers accuracy, and just as certainly it is accuracy that we must have.

#### OTHER PROBLEMS IN DIATHERMY STANDARDIZATION

The whole problem of standardizing diathermy is a highly complicated one, and its complexity grows as we become better acquainted with it. There is surprisingly little dependable scientific information on the subject, with reference to the most basic considerations, and there is opportunity here for research of the greatest interest and of the greatest practical value. What do we really know, for example, of the path of the heat or the current through the structures between the electrodes? Have we been taking into consideration the great differences in electroconductivity of the various tissues that make up the body? Resistance offered to the current is by no means uniform. Bone and skin, for instance, present a high resistance, while muscle conducts the current very readily. Again, what do we really know about the degree of heat to which normal living tissue can be subjected for a given length of time and still recover? The evidence available on this point is sur-

prisingly meager, and yet what question can be more vital in the safe employment of electrothermy. What are the differences in sensitivity to heat between the normal cell and that which is diseased? These and many other questions present themselves in any careful consideration of this subject. I submit them, not as hopeless difficulties, not as reasons for despair, but rather believing that the game is worth the candle and therefore should be well played.

I am reminded in this discussion of the favorite challenge of the late Dr. Lovett to his students. It seems to me to be pertinent in many of the fields of our endeavor. "What are you trying to do? Is it worth doing? Are you doing it?"

#### UROLOGICAL INDICATIONS FOR DIATHERMY

The space allotted to me here does not permit a detailed discussion of the conditions in which diathermy may be properly employed in urological work. In general, however, we may classify them as medical and surgical.

*Medically*, this form of therapy is chiefly applicable to the treatment of the most common urogenital infection, gonorrhea, and its complications. It is based upon the established fact that the lethal dose of heat for the gonococcus is relatively low as compared with that of other common pathogenic organisms, and upon the further assumption, which is probably correct, that the gonococcus may be destroyed by a temperature that will not at the same time damage the tissues of the host. Common clinical experience has frequently demonstrated the sensitivity to heat of this particular microorganism. It has been repeatedly observed, for example, that a profuse urethral discharge has subsided with the advent of some intercurrent general infection, characterized by marked pyrexia. It is true, furthermore, that the gonococcus flourishes nowhere better than in the anterior male urethra, in which the temperature, normally, has been demonstrated to be well below 98.6° F. There is also abundant laboratory evidence to sub-

stantiate the fact that this organism may be readily destroyed by relatively low temperatures. Unfortunately, however, these experimental observations have been based largely upon studies of cultures grown upon the surface of artificial media. In an effort to approximate a little more closely the conditions existing in the body, I have had cultures embedded in the depths of moist media, subjecting them to various degrees of heat, to determine their lethal dose under these conditions. Fifty-three degrees Centigrade for ten minutes were found to destroy all growth. These are imperfect analogies, however, and there is an interesting opportunity for useful research which will define exactly the temperature necessary to kill the gonococcus in a given period of time, when it is actively growing in living human tissues.

Of course there are other general considerations in the use of heat in the treatment of infection. By increasing the activity of the circulation in the part involved, heat also serves to bring to the disease area an increase of those blood-borne bactericidal elements which the individual normally possesses, and which largely constitute his natural defense against infectious processes. Thus heat serves a double purpose in producing conditions more favorable for the host and less favorable for the invading organisms.

In theory, therefore, we are justified in the attempts that are being made in the treatment of gonorrheal infections by diathermy. The clinical results, however, are as yet by no means uniformly satisfactory. In acute and chronic gonorrhea in the male (urethritis, prostatitis, seminal vesiculitis, etc.), though improved methods may accomplish more as the field is developed, there is as yet no evidence which warrants abandoning the old established therapeutic measures in favor of diathermy. To be sure this form of heat may give symptomatic relief more promptly and effectively in those acute fulminating infections of the prostate that we have usually treated by means of

rectal irrigations with hot fluid. Surprising results have been obtained by many, moreover, through the employment of electrothermy in the early acute stages of gonorrheal infection of the epididymis. Diathermy will not suffice, however, and should not be expected to, when actual suppuration has occurred in these structures, at which time surgical intervention offers the only hope of prompt relief.

With particular reference to the employment of high heat in the treatment of acute epididymitis, the recent work of Prof. Carl Moore of the University of Chicago offers new considerations of the greatest interest. This work<sup>1</sup> is so stimulating and seems so pertinent to our present discussion, that I wish to quote briefly from some of the author's conclusions. He builds his case as follows:

"From our results so far obtained there emerges conspicuously the larger general conception that the scrotum of mammals is a structure the function of which is to regulate the environmental temperature of the testes; it is a local thermo-regulator of the male mammal and controls the activity of the testis by providing an optimum environment for spermatogenesis. That it is essential for the continuance of germ-cell differentiation is beautifully shown by removal of the testes from the scrotum or by experimentally interfering with its function. It is believed that sufficient evidence is at hand to make it reasonably certain that we can now assign to the scrotum a very definite and essential function.

"Mammalian testes transferred as grafts from one animal to another and placed subcutaneously, intramuscularly, or intraperitoneally, may be recovered months later in a condition in which the seminiferous-tubule outlines are indistinct and containing, or not, certain of the earlier stages of spermatogenesis. It has been a problem since first mammalian testes were transplanted to explain the invariable

<sup>1</sup> Moore, C. R. Properties of gonads as controllers of somatic and psychical characteristics; heat application and testicular degeneration; function of scrotum. *Am. J. Anat.*, 1924, xxxiv, 337.

absence of differentiated spermatozoa from the grafts. In certain grafts the tubules will build an epithelium consisting of spermatogonia and spermatocytes, possibly spermatids, but instead of undergoing transformation into flagellated spermatozoa the innermost cells become loosened from the epithelium, are thrown out into the lumen of the tubules, and undergo degeneration. Hundreds of mammalian testis grafts have been studied in this and other laboratories without finding spermatozoa. Not until the testes were transplanted in the scrotum were grafts shown to be capable of differentiating spermatozoa. It appears, therefore, that spermatozoa are differentiated only when the testis is located in the scrotum.

"It has long been known that undescended mammalian testes are without spermatozoa and, for the most part, are devoid of all germinal cells. As long as the testis is retained within the peritoneal cavity it remains degenerate, but if the testis is returned to the scrotum after the generative portion has disappeared regeneration will follow and the testis will return to a normal condition after a few months. The scrotal-testis relationship appears essential for the completion of spermatogenesis. . . . The evidence follows that this relationship is one in which the scrotum functions to regulate the environmental temperature for the testis, and that degenerate conditions are due to an abnormal temperature relationship.

"It has been determined that the testis can be caused to degenerate while in the scrotum by merely insulating the scrotum against loss of heat. The scrotum of a ram was snugly wrapped with woolen materials, taking due precautions against binding or abnormal pressure, and within eighty days the testes were found to be devoid of spermatozoa. The animal sterilized itself with its own body heat because of the interference with the local regulatory capacities of the scrotum.

"An investigation of the temperature of the abdominal cavity, in comparison

with that of the scrotum has been made on rats, guinea-pigs, and rabbits with the result that a demonstrable difference has been found to be the normal condition. In every case observed the temperature was from 1° C. to 1.5° C. lower in the scrotum than in the peritoneal cavity at the same moment. This unexpected difference in temperature varies with the external environmental temperature; thus in a white rat, observed in a room temperature of 16° C., it was found that the scrotal temperature was 8° C. lower than that of the peritoneal cavity. An animal sterilizes itself, therefore, with its own body heat if the testes are experimentally or naturally retained within the abdomen.

"Finally, slightly higher than normal temperatures have been applied to the surface of the scrotum to ascertain if it is actually heat that is responsible for degeneration. It was found that degeneration of the generative portion of the testis followed, in part or entire; it may be visible within a period of four to six days after subjecting the scrotum to a single application of heat that is but 7° C. above the normal body temperature. The application of heat is followed by similar reactions, whether given by means of electric light, electric stove, or hot water.

"By submerging the testes direct in a controlled saline bath of 47° C. (117° F.) for five minutes the testis will be found so degenerate that none of the tubules approach the normal condition five days after single exposure."

If we are to accept this work of Moore, and it is interesting that similar experiments and conclusions have been presented separately by Fukui in the *Japan Medical World*, it is at least strongly suggested that diathermy, as now applied to acute scrotal infections, may not be the entirely innocuous procedure that we have believed it to be.

In gonorrhea of the urethra and lower genital tract in the female, a good deal has been accomplished with diathermy, and the technique that is being evolved bids fair to be most useful in combating this

stubborn condition. The easily accessible short urethra can be readily subjected to heat by an electrode placed within its lumen, the indifferent or directing electrode being so applied as to encircle the pelvis of the patient. Similarly the cervix, which is largely responsible for the chronicity of this disease in most instances, may be treated through the use of special active electrodes designed to lie within the endocervix. For this purpose I have devised an electrode which is made in the form of an ordinary wood screw with an insulated shaft. It is literally threaded into the cervical canal, giving more intimate contact with the tissues than can be obtained with the usual smooth-surfaced instrument. It offers a greater area for radiation, moreover, and when withdrawn in its long axis at the close of the treatment serves as a curette to draw away the accumulated secretions and destroyed mucosa.

By these means, the urethra and cervix may be treated in chronic gonorrheal infections with most satisfactory results and, in many instances, with more prompt relief than can be obtained with older methods of medical treatment. The technique requires the greatest care, however, for it is quite possible through errors in judgment or excessive dosage of heat, to inflict damage of the most serious sort. I do not believe that the method should be applied in the very acute purulent stage of the disease, and I do not believe that it should be used in the presence of any demonstrable surgical pathology in the uterus, tubes and ovaries. Employment of diathermy as a glorified hot water bottle in the treatment of salpingitis should most certainly be condemned, as should all attempt to treat the viscera by this means alone, in the light of our present knowledge.

Work of the greatest interest in the treatment of gonorrheal infections in the female by diathermy has been done by Cumberbatch of St. Bartholomew's Hospital in London. His recent book on the subject is an excellent treatise in this particular

regard, and in its consideration of the subject of diathermy as a whole.<sup>1</sup> In his treatment of the urethra and cervix, Cumberbatch depends for control of dosage upon the sensations of the patient and the record of a thermometer which is enclosed within his active electrode. His results are most interesting. Dr. Bovie and I, through the Conservation Bureau of the Boston Health Department, are planning the study of this problem at the present time, particularly as applied to vulvovaginitis in infants and young girls, a disease which we have already demonstrated to be of gonorrheal origin in practically every instance. In general we are planning to use the methods described by Cumberbatch, adding, however, the more accurate basis of dosage offered by controlled diathermy.

A word may be said also concerning the value of diathermy in the treatment of the involved joints in cases of gonorrheal arthritis. Heat penetrating through the tissues in and about the joints should be and is of the greatest aid in relieving the symptoms and hastening the processes of repair. Surely, however, in so definite a focal infection, it is not rational to treat the joints by this method alone until the focus of gonorrheal infection has been definitely cured or extirpated by medical or surgical means.

*Surgical Applications.* In conclusion I wish to mention briefly of the purely surgical applications of diathermy, and to pay my tribute to the remarkable advances that already have been made along this line. Here, diathermy needs little criticism and no defense. The destruction of tumor tissue by desiccating current or its removal by cutting current are now established measures of the greatest usefulness. I am confident, moreover, that the value of electrosurgery is destined to grow steadily greater as methods and mechanisms become more simple, better standardized, and more generally available.

While we still rest solidly on the under-

<sup>1</sup> Cumberbatch, E. P., and Robinson, C. A. *Treatment of Gonococcal Infection by Diathermy*. Lond., 1925.



lying principles of surgery in the treatment of malignant disease, and while we find invaluable aids in radium and deep roentgen therapy, there are many instances in which destruction and removal of the tumor tissue by heat offer advantages of the utmost importance. We have learned, moreover, that there is no form of heat which compares in effectiveness for this purpose with that of the high-frequency current. This is true because of certain basic considerations which are now well understood. As compared with the actual cautery, for example, it penetrates more deeply and with greater uniformity, and with an absence of char about the electrode, which insulates the tissues against the further spread of heat. Even more fundamental is the fact that the heat of diathermy is formed in the tissues and not in the instrument itself. The relatively recent addition of the cutting current or radio-knife is a brilliant contribution,

which aids materially in difficult dissections, in the control of hemorrhage and in minimizing the dissemination of active tumor cells.

Indeed, there is so much of present good and so much of promise in this latest adjunct to the surgery of malignant disease that we should eagerly continue our efforts to develop it to the level of its greatest usefulness. To this end, we must especially accomplish the accurate dosage of heat, whether by controlled diathermy or some other method equally informing, and we must determine with exactness the reactions of living tissues to high temperatures.

It is my earnest plea (and I have but outlined the problem in part) that we do not rest in this matter until we understand as fully as may be the principles underlying diathermy, and answer decisively all those basic questions upon which its successful use depends.



#### [SURGICAL SUGGESTIONS]

SUTURE of the mesial cut edge of the divided external oblique aponeurosis to Poupart's ligament, while it will unite more surely than will the muscle edge of the internal oblique, introduces no new feature into the arrangement of the canal, except insofar as it narrows the superficial ring and somewhat increases the tension of the aponeurosis. The external oblique aponeurosis was attached to Poupart's ligament before the surgeon split it to open the canal! If, however, the mesial edge of the cut aponeurosis is sutured to the inguinal ligament *beneath* the cord, i.e., if the cord is transplanted to lie upon the external oblique, then, of course, the architecture of the canal is decidedly altered.

# PHYSICAL THERAPY

## IN ITS GENERAL PRINCIPLES\*

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PHYSICAL therapy has outlived and lived down the false theory that its results are psychic. This is in direct opposition to a statement made to me by a general practitioner that in dealing with sexual impotence, electrotherapy, in his hands, has imaginary results. Small wonder, because if the diagnosis is incomplete the treatment will be inadequate. Furthermore, we cannot deny possible and future results measured in terms of actual and present results, because all our sciences are progressing amazingly into fields unknown. It is high time for a real search for truth, accepting new methods, not without due consideration and test, but with realization that every mode of treatment may possess great merit, and if it does the really scientific physician will employ it.

Correct and full diagnosis is absolutely necessary, and equally important is the quality of the treatment which I have elsewhere described in these words:<sup>1</sup>

"Long treatments of twenty, thirty and forty minutes are the ones which produce the results. During the period of lowest resistance, it is probable that daily treatments are most advisable. For example, one of my friends in the insurance compensation field has found that a daily radiant light treatment in indolent cases will maintain the rate of healing very much better than every other day, although each session may be a half hour long. The physiological results are more important than meter indications, and in diathermy they are more important than thermometer indications because a thermometer cannot possibly reach wherever the current passes. Subjective sensations are important. Those

which the patient feels very definitely and may complain about, especially if followed by a reaction after treatment, usually indicate a current so strong that it is apt to defeat its own object. Conversely, a current which the patient does not feel except to describe it as soothing is the very one which is going to do the good."

Periods of rest, imitating the heart action, are paramount. Fatigue is never advisable in medicine, whether produced by physical exercise, exhibition of medicines, or application of electrical and other physical measures. Our organs are essentially delicate, particularly in their cellular structure.

To project a strong electric current at the prostate or the uterus is as foolish as to knock the patient down with a stream of water or to rupture the cervix or the urethra by divulsion wrongly called dilatation. Hence such modalities as the static wave current should be interrupted with the metronome<sup>2</sup> and oscillating currents, such as the galvanic sinusoidal, should be preferred. Variations in these currents should be timed to agree with the pulse rate or a multiple or a subdivision thereof. Patients should always be allowed to rest for a few moments after treatment.

Pain excited or augmented by the treatment always indicates decrease in the energy or change in the character of the current. After-effects of this type must not occur.

Adjuvants must not be neglected, such as attention to the general strength and health, and variation in methods. Hydrotherapy and massage should always be used as associate methods, and practically all electrical modalities should be varied

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and coordinated. Only the fanatic relies on one method and one idea.

The use of heat in medicine is about as old as the science and art of medicine itself, but recent knowledge has shown three kinds whose differences must be fixed in the mind of the physician:

1. Conductive heat is that produced by contact, as with a hot water bag or bath. Unless the heat is maintained at a constant level by the regular or frequent addition of hot water, it is of little real value.

2. Convective heat is that produced by radiation from a lamp or other source. This is extremely useful provided the lamp is efficient, the distance from the skin proper, and the length of application correct. After the treatment the skin should remain reddish or blotched for at least fifteen minutes, during which time the patient must rest and be guarded against exposure.

3. Conversive heat is energy (usually electrical) transformed into heat within the tissues themselves by overcoming the resistance of the tissues in passing through and through the site of application.

Hyperemia is analgesic, bactericidal, absorptive, solvent, nutritive, and a stimulant of the blood. It should be made to decongest the wide area surrounding inflammation. The benefit of physical therapy is that it institutes constructive nutritive arterial hyperemia in contradistinction to the venastatic hyperemia of Bier. Diathermy is the term applied to conversive heat originating from a high frequency current passed through the tissues. Too much attention has been applied to the thermometric element of this heat rather than to its biochemical action upon the entire region, as that of the prostate, including the nerve, arterial, lymphatic and glandular elements. Again the physiological result is of supreme importance and superior to a thermometer reading.

Any current heaps up on the smaller of the two electrodes and determines the point of maximum heat and hyperemia

near to itself in accordance with the difference in size between the two electrodes. If the small electrode is a needle, far-reaching caustic effects are delivered by the current jumping or passing from it. It is possible to determine with reasonable accuracy the point of maximum hyperemia and physiological results, by varying the size of electrodes in treating organs like the kidney, uterus and prostate with the high frequency current. The caustic destructive effect at the needle point is familiar at the positive pole of the galvanic machine and at the needle point of the high frequency machine.

Irritation and counterirritation are generally and successfully provided by the various spark applications and devices consisting really in stimulation. The standard positive pole static brush discharge or Travell positive pole static brush discharge or DeKraft's high frequency effluve or brush discharge are familiar examples. Sparking from the static machine and the high vacuum and condenser discharge glass bulb electrodes are other examples.

Ionization is an old term subject to revision yet to be determined. Upon the skin it is of little or no value, probably on account of the dense, horny layer, but on mucous membranes, especially if diseased as in the deep urethra and uterus, it is of definite value. Zinc and copper electrodes attached to the positive galvanic pole with the distributing pole wrapped about the abdomen will deposit oxychloride of the metal to a depth of about a half centimeter. One must have a list of electropositive and electronegative substances available for ionization because electronegatives, as, for example, iodine, must be applied from the negative pole.

Within the general category of stimulation come the static wave, the galvanic sinusoidal, the Morse wave, and the faradic currents.

These thoughts present the common fact that tests and observation must decide the modality or series of modalities finally employed for a patient because a given

individual may require one modality, another person a different modality and a third two or more modalities illustrated by diathermy-static, diathermy-sine wave, and diathermy-massage combinations. Many others might be mentioned as general principles.

The application of these principles involves congestion, inflammation, abscess, cellular proliferation as in the prostate, cellular destruction as in ulcers, and cellular degeneration as in neoplasms. Each should have brief consideration.

### CONGESTION

Gould defines congestion in these words: "An abnormal collection of blood in a part or organ. Congestion may be active or passive, atonic or inflammatory, functional or hypostatic." Probably physical therapy is concerned most with active or passive, and atonic or inflammatory congestion, in each of which the circulation is basically at fault, and to alter which must be its primary aim. This is accomplished chiefly through modes of drawing off the blood directly from the part to surrounding parts and thus restoring the balance. Heat is the means almost *sine qua non*. Hot hydrotherapy applies it by conduction and succeeds only in proportion as the temperature is maintained at a constant level. Light develops heat by convection to the depth of about  $1\frac{1}{2}$  inches within the tissues. Its success is great in proportion to the size of the area covered, the duration of the application, and the persistence of the redness of the skin immediately thereafter. Heat by conversion is supplied with reasonable accuracy to any depth between the two electrodes through diathermy, whose physiological results overshadow the patient's sensation of heat or the indication of heat by the thermometer. A current which can be tolerated for thirty minutes without discomfort to the patient is far better than a more massive but brief treatment. Adjuvant to the heat is stimulation of the part, when possible,

by mechanotherapy, massage, and passive and active exercise.

### INFLAMMATION

According to Gould inflammation is "a condition of nutritive disturbance characterized by hyperemia with proliferation of the cells of a tissue or organ, and attended by one or more of the symptoms of pain, heat, swelling, discoloration and disordered function." The predominant element here is disordered nutrition. Therefore no element of physical therapy can depress the processes of nutrition and succeed. The hyperemia in the affected part must not be augmented but rather relieved by extending the hyperemia to widely surrounding zones and thus making a focal balance in the circulation. If the inflammation flares up the treatment must be changed. The local function as a whole is to be restored to balance and not thrown out of balance. Mild diathermy over as large an area as possible usually decreases the hyperemia in the affected part and the resulting increased arterial blood supply almost invariably restores the nutrition.

The special symptom of pain must never be accentuated. It is commonly due to pressure on the nerves by the swelling and the hyperemia. The more quickly and fully the balance of the blood pressure and heat are restored, the more prompt will be the relief of the pain.

Radiant light from the incandescent or arc lamp is of great value and a reliable substitute for diathermy when the latter irritates because of its transit through and through the part. As yet no one has determined the value of the so-called actinic influences of light in particular and of diathermy in general as to chemical, biochemical and germicidal factors. Improvement in function follows proper treatments. Glands begin to renew their activity. Errors should be on the side of gentleness, exactly as one does not intoxicate a patient with a drug. The relaxation of smooth muscle fiber in a gland by

diathermy and the sedative action of widespread heat through diathermy and of heat through light accomplishes much the same object.

Direct stimulation of the muscularis of a viscus such as the bladder or uterus is usually bad practice until recovery is at hand. Certainly the bladder should always be empty so that the positive contraction induced, for example by the static wave, does not pound against the incompressible urine.

Common sense must be exercised as to the distribution of inflammation, of which orchitis is an example. This lesion is always associated with much rather than little funiculitis, seminal vesiculitis and prostatitis. Hence the author does not consider it good judgment to treat the testicle alone with diathermy, for example. A mesh electrode should be placed on the testicle, a soft metal plate on the groins and pubis, and both connected as one electrode, while a distributing electrode of somewhat larger size is placed under the buttocks. Only in this way can the benefit of diathermy be distributed to all the involved parts as named.

#### ABSCESS

"Where there is pus, evacuate" is one of the insurmountable rules of surgery, and in physical therapy great caution must be exercised unless there is an outlet for the pus as solvent action begins; otherwise probably dangerous absorption is instituted. Probably the success of diathermy in pneumonia rests on the principle that as soon as the current begins to soften the consolidation, evacuation of the inflammatory product begins and is carried on by expectoration. In general even small quantities of pus had best be left to incision by the surgeon before the application of physical measures, except, perhaps, radiant light and similar measures, which do not pass through and through the accumulation. After drainage has been secured, the manifold influences of diathermy are inviting

and satisfactory. Radiant light is of great aid in its actinic, analgesic and stimulating spheres. The roentgen ray, of the form and dose hereinafter described, is an influence of great reliability. Ultraviolet light is said to serve admirably in certain forms of local infection and no doubt has a sphere in its general tonic effect somewhat like that of sunlight.

#### CELLULAR PROLIFERATION

The term cellular proliferation is used as a substitute for fibrosis in viscera such as the prostate and uterus. I am extremely doubtful whether any form of physical therapy has any direct influence on these changes unless it is the roentgen ray. It is certain that this modality will check hemorrhage from both of these organs and compel a variable degree and sometimes a high degree of restitution of parts. Occasionally one sees fibroids of the uterus totally disappear. When a prostate, however, decreases under its influence, it is by a process of condensation, so that the resulting gland is almost a cicatrix. Hence, if the obstruction within the urethra is not correspondingly removed, an operation becomes more and more urgent and difficult on account of the dense tissue left behind. The whole process is so slow that cystitis and ascending ureteral and renal involvement may appear so far ahead of beneficial results as to nullify them. Hence I am of the most positive opinion that no prostatic work should be undertaken except with the guidance of a cystoscope in the hands of an expert urologist.

In all this work the quality of the roentgen ray becomes important. Fortunately the majority of the professional public is unlearning the mistake of the "mass-and-flash" dose of roentgen ray which has beguiled the experts for over ten years. By the term "mass-dose" I mean the ultimate quantity and quality of current that may still be called safe, and by the term "flash-dose" is meant an application so brief that burning of the skin is impossible.

The crux of roentgen-ray work seems to be milliamperc-minutes. Beyond question a 50, 60 or 70 ma. m. dose of high voltage but low amperage and of long rather than short application is the method to be preferred, because it does not damage the normal parts while it does destroy the diseased parts which are much more vulnerable to it. This is the method of roentgen-ray application which I have never forsaken, notwithstanding the enthusiasm of many others for the "mass-and-flash dose." As I have elsewhere said:<sup>1</sup>

"The x-ray is stimulating or inhibiting according to dose. The stimulating dose causes hyperemia and cell action while the inhibiting dose produces tissue contraction and cell decline. These are the bases of action in prostatic cases. Hemorrhage may be controlled with the x-ray. The source may be the static machine or the transformer. The static machine seems to have the advantage of about 127,000 volts when the standard ball terminals (0.866 inch in diameter) are 15 cm. apart according to Harris and Reiss, both noted and independent investigators. Such voltage gives greater penetration than that from a transformer, having greater amperage but lower voltage. X-ray treatment with the static machine for thirty minutes at 2 to 2.5 milliamperes, thus delivering seventy or seventy-five milliamperc minutes, may be more serviceable than treatment by a transformer delivering 10 milliamperes for two to two and a half minutes, in total 20 to 25 milliamperc minutes under considerably lower voltage and lower penetration but higher burning powers. This comparison is probable but is still under study. The x-ray tube vacuum should back up a five-inch spark gap between the ball terminals. This gap is equal to a ten-inch distance between the pointed terminals of the transformer machines. A transformer with standard ball terminals will deliver about the same voltage but the higher amperage is almost sure to burn the patient. Burns with the static machine are rare, when compared with remarkable results."

#### CELLULAR DESTRUCTION

In Gould's dictionary the brief definition of ulcer is: "A destructive loss of cutaneous substance extending into the coreum." This is an example of the difficulty of creating an inclusive and exclusive definition. Only ulcers of the skin are included in these words, whereas ulcers of the internal surfaces are universally under treatment. Nevertheless, ulcers of the skin are chiefly those under direct treatment by physical therapy. The indications are to clean the surface in a surgical sense and to promote healing by suitable stimulation. Any of the ordinary modern wet dressings may be systematically and carefully employed. Ultraviolet light in a stimulating dose at a distance of 30 inches for four or five minutes, gradually increased to 18 inches for from five to twenty minutes, is of great value and will not burn or irritate under these details. The air-cooled instrument is preferred. Stimulating doses of roentgen ray every three to five days are very valuable. Débridement of the unhealthy indolent tissue down to healthy granulating tissue is undoubtedly the first indication, a very sound surgical principle and one which the average electrotherapist must follow. Circulatory and lymphatic return are aided by elevation of the part, deep muscular massage, and proper bandaging. Radiant light from the incandescent lamp and the carbon arc, static brush discharge from the positive pole (Travell's method) or the high-frequency effluve (DeKraft's technique) are all of great value. Zinc ionization may be used once a week.

The normal indolence of ulcers means that the results of such treatment are slow.

#### CELLULAR DEGENERATION

No definition of cancer can be attempted, but cellular degeneration both in overgrowth and in death is certainly an inclusive term although it is not directly exclusive and must answer the purposes of a paper of this character. Physical

therapy offers radium and the roentgen ray. To the disadvantage of radium is its high cost, difficulty of acquisition, and above all local or limited action. These are the reasons why I have never used radium. The roentgen ray, on the other hand, performs all the functions of radium, is very easy of acquisition, and has a widely distributive action exactly into the zones where most needed. These are the earliest possible extensions along the vascular and lymphatic channels and by contiguity into other parts of the organ or tissue involved. The roentgen-ray dose may be fully controlled, definitely distributed, deliberately transferred, for example, from the pelvic to the abdominal region, as exemplified in the kidney, ureteral, general abdominal and general pelvic areas. The reasons for preference for fractional roentgen-ray dose over the mass-and-flash dose have just been described. The notable work of W. L. Clark<sup>3</sup> and G. A. Wyeth<sup>4</sup> has demonstrated beyond question the value of the high-frequency current through a needle applied at, in and around the offending growth, with a distributing electrode on the opposite side of the body under a milliamperage of about 2000. Desiccation is produced by the milder currents of this type applied to superficial conditions. Coagulation is the next step produced by increasing the current, and finally carbonization is the last stage reached through the extreme of current.

In my opinion control of the current under the eye by a spark gap is of much more importance than meter readings.

In a special research, Cunningham, Graves and Bovie<sup>5</sup> believe that they have established an accurate control technique. This article was sent to the expert of one of the leading manufacturers who has written to me as follows: "From the paper I cannot see in what manner they control. However, they are showing how they indicate the heat on a meter. How they can claim an improvement in the method of destroying tumors is not obvious, and I doubt very much that they have come any

nearer to a good method of curing cancer of the bladder. It does not make any difference what kind of an electrode is used, whether they screw it in or jab it in, or whether they use plates." This authority then goes on to point out the danger of absorption from decomposed cancer substance, the necessity of very active elimination, and the value of such physical methods as the sinusoidal current for promoting this elimination. It is interesting to note that this layman learned these important things at a European Congress a short time before his letter was written.

My opinions on these points are very aptly set forth in the following abstract from a recent paper. Sloughing tissue with or without bacteria is a source of toxic absorption of unknown quality, degree and termination. War experience developed our new definition of shock: "traumatic intoxication." A tourniquet placed on the thigh for an extensive injury of the leg prevented said absorption and shock until removed, unless the sloughing mass was freely removed down to healthy tissue. How much more must such poisoning arise when drainage as in the bladder and its environs cannot be adequately provided. Undoubtedly widespread coagulation of bladder tumors through so-called surgical diathermy is no longer good surgery or electrotherapy. The index of the thermometer is of little value. The dead mass must not be left in situ because death is so apt to supervene from the albuminoid poisoning. Débridement of the slough produced by the currents is as necessary in the bladder, as débridement is essential in gunshot and other war wounds. "All consideration and judgment in these cases are the reasons why the writer has never used this form of mass coagulation of cancer of the bladder and has never relied on the thermometer as the best index. Apparently the method which he has always preferred is just beginning to be applied systematically by urologists."<sup>6</sup>

The technique I prefer is as follows: Under sacral and parasacral anesthesia,



suprapubic cystotomy is centered over the general mass of the tumor; the bladder mobilized and freely retracted. The balance of the technique is described in the foregoing article thus: "Electrocoagulation is employed using the damped high-frequency current of such potential that the superficial layers of the growth are carbonized, the next layer densely coagulated and the deepest layer slightly coagulated. A sixty square-inch metal electrode is placed under the buttocks well soaped for perfect contact and the hand-electrode is a well-insulated copper electrode brought to a sharp point. An air-gap of about one-quarter inch is maintained between the point and the growth not only to intensify the spark but also to keep every step of the work directly under the eye. No thermometer to determine the thermometric heat is at any time employed. As soon as the surface of the growth is carbonized in this way all the tissue is carefully removed with a sharp rongeur to minimize the traumatism of the cancer and then another field of electrocoagulation developed and removed. These steps are repeated until every vestige of the growth is gone as far as naked eye and finger can determine. The growth is usually so situated that the only other operation which can be thought of is transplantation of the ureters and removal of the whole bladder and prostate which the patient rarely survives and which remotely would not benefit him because the situation of the cancer and its traumatism by the action of the bladder extend the growth far into the lymphatics beyond the reach of any

surgery. Therefore any operation including the one performed must conform to the temporary and palliative type as duly explained to and accepted by the family physician."

Roentgen ray is employed by the cross-fire divided dose method for at least six treatments before the operation and six treatments after the operation. At the end of three, four and six months after the operation other courses of roentgen-ray treatment are given in order to prevent as far as possible any secondary deposit.

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# PHYSICAL THERAPY

IN MEDICINE AND SURGERY\*

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THE subject of physical therapy has gone through a period of intensive investigation since the latter days of the War, and consequently much of the mysticism and many of the supposedly superhuman reactions caused by treatments with the modalities included under this head have been explained and exposed. We no longer consider it a very deep subject because we know all the reactions are governed by unalterable laws of physics and physiology. As an instance of this fact I might mention that most of the treatments in physical therapy today are not administered by the physicians themselves but by lay technicians especially trained in the handling of the machines we use. They do not presume to know enough medicine to treat diseases, except as directed by the physicians in charge of the hospital departments or offices in which they work. Such a method of administering any other forms of treatment could never be resorted to in the procedures we class under the head of surgery, medicine, gynecology, etc.

We use the physical measures included under the term physical therapy only in an effort to convert an inadequate physiological reaction in the body into one that is adequate to overcome the pathological process. In our use of physical forces, we can bring about only three reactions in a physiological way, and we have to depend upon the actions of these results of physical therapy in our effort to help the patient overcome the condition presented.

The three reactions we can produce in the body are the formation of heat where and to what degree we want, the effects of mechanical motion or exercise, and some

weak but potent chemical reactions. That is all physical therapy does: it produces heat, produces more motion than the body itself is capable of exerting in certain locations, and produces chemical reactions that sometimes are of distinct benefit to the body. I endeavored to explain these fundamental reactions more fully in a paper presented before the American Hospital Association.<sup>1</sup>

It is always a good thing to give all the definitions possible when presenting a subject. I can give a definition of physical therapy which, although not absolutely certain, is approximately an evaluation in percentages. As in all therapeutics, the medical training and common sense of the physician are by far the greatest factors. I believe that fully 95 per cent of physical therapy is a correct understanding of physiology and pathology. This is the presumed equipment of successful physicians and surgeons today. Of the remaining 5 per cent of physical therapy, perhaps 2 per cent is an understanding of the three primary reactions that I have already cited. The final 3 per cent of physical therapy is the technical knowledge of applying the different modalities in the most convenient and rational way. We physicians who apply physical therapy must have this 3 per cent, but others who might choose to give patients the benefit of physical therapy do not need it. It is this 3 per cent only that we desire our technicians or non-medical assistants to acquire, because theirs is rather a routine procedure whereby they apply the prescribed modalities. These technicians and those of us who practice physical therapy are

<sup>1</sup> Titus, N. E. What is physical therapy? *Mod. Hosp.*, Chicago, Dec., 1926, xxvii, 54.

\* Read before the Bedford Medical Society, Brooklyn, N. Y., December 14, 1926.

related to the medical profession in much the same way that pharmacists are, except that we actually give the doses of physical forces, following out in many cases the prescriptions ordered by the physicians in charge, while pharmacists only compound the prescriptions and hand the bottles to the patients to take as prescribed.

Therefore, in presenting the subject of physical therapy as a means of more successfully carrying out general practice or specialized branches of general medicine, I want to emphasize that you already have 95 per cent of the subject. I wish merely to supply the other 2 per cent; and perhaps in discussion I can help those who wish to apply the modalities to acquire what they need of the remaining 3 per cent.

It is extremely difficult to lay down the exact technique of administration for certain diseases or pathological conditions that present themselves in our patients. I cannot give full assurances that the technique I describe will be absolutely correct, nor must it be entirely depended upon because merely through practice I have acquired techniques that may to others seem unnecessary. Since all of us have 95 per cent of this subject, general reasoning and understanding of the physiology and pathology may cause individuals to originate techniques of their own. There are no standardized techniques and I shall be very interested to see a proposed publication by the American Medical Association wherein will be described standardized techniques for different treatments. I only hope that it will be published as "a guide to technique," including specially designated standardized steps.

Before going into specific diseases it is necessary to present a few facts in physics and physiology that are in a way quite necessary to an understanding of why I may suggest certain forms of treatment in contradistinction to others. When we choose to produce heat within the body we have available two extremely potent methods. It has been proved that radiant

light from an incandescent bulb is capable of forming heat at different layers beneath the skin in the living body to a depth of about  $1\frac{1}{2}$  in. One can fully appreciate that this is possible if he will stop to think of the old law of the conservation of energy which emphasizes the fact that energy in motion, when stopped, becomes heat. If we can make light energy penetrate through  $1\frac{1}{16}$  in. of skin, as was proved by Kinney some years ago, we know that the amount of light which does not get through the tissue but strikes the skin on the outside is stopped within the tissues of the body, and light, being energy in motion, forms heat at the levels where the motion is arrested.

There is no other means available in therapeutics except electricity that will form heat beneath the skin. Mustard plasters, flaxseed poultices and even actual cautery do not cause any particular heating of the tissues beneath the vascular layer of true skin. Let me cite one experiment performed by Dr. Karl Sonne of the Finsen Medical Light Institute of Copenhagen. He placed thermopiles in the deep veins of the upper arm and on exposing the forearm to light energy was able to prove that the blood coming from the forearm was heated to  $115^{\circ}\text{F}$ . Think of the potency of such a method of forming heat in tissues. If you choose to be experimental in your consideration of these things, try radiant light on an acute myositis or on a pleurisy and see the great relief that you give to your patients.

The other means of producing heat in tissues is with the use of high frequency electricity. Years ago d'Arsonval discovered that an electrical current passing through living tissues alternating at a frequency of greater than 5000 per second did not produce any electrical, nervous or physiological response in the tissues traversed. He did observe, however, that the tissues placed between the electrodes acted as a distinct resistance to the current, and we all know that a resistance in an electrical circuit causes the formation of

heat in this resistance. Therefore with high frequency electricity, probably more commonly known as diathermy, we have a means of producing heat at any depth in the tissues and to any degree we wish by merely interposing the tissues in a circuit through which the high frequency current passes. Contrary to a recent dictum that has been getting widespread attention, diathermy does not cause the production within tissues of heat that then comes to the surface; the heat is formed in the living tissues throughout the entire inter-electrode path. I grant that the heat is generally more effective in a circumscribed locality in this interelectrode path, but this is merely because Nature has endowed us with such protective faculties that we are able to dissipate a great deal of heat generated in the path between the electrodes, so that the point of maximum intensity causes a greater physiological effect merely through the action of the body and not through any peculiar reaction of the electrical current itself.

To produce mechanical reactions we have a very valuable method, and that is by massage and exercise. Had the medical profession years ago not believed that massage was too unprofessional for them to direct or administer, we would not today have the foolish competition to our decent methods of treatment, from chiropractors and other rubbing cults. They are capitalizing the fact that massage and exercise can produce some results even though the members of these cults are too ill informed to appreciate the indications and contraindications. The more we use massage and exercise, rationally directed by competent operators, the greater respect physical therapists have for this method of treatment. I shall speak of its particular use later.

The other method of inducing mechanical effects is the use of static electricity. This is a current of extremely high voltage or pressure and extremely low amperage or volume, and consequently when we work with a force under such high pres-

sure we can bring about mechanical effects produced by pressure. Static electricity always has been used for therapeutic purposes and was the original electrical current. It is coming back into its own, now that we have a more scientific understanding of the subject, and I would no more regard as well equipped a department of physical therapy without a static machine than I would claim an automobile was perfect without a full set of wheels.

Concerning the chemical reactions that we can produce, we are learning almost daily of the very beneficial effects that are obtained by the administration of ultraviolet light. We are getting to know more and more about this wonderful modality. One of its most potent effects is its influence upon phosphorus and calcium metabolism in the treatment of rickets and tetany. Of course there are some chemical reactions induced by the galvanic current but these are extremely weak and have a limited field of usefulness. It is not my desire to go into great detail concerning these modalities nor have I thought to give any special mention to hydrotherapy or thermotherapy, which are quite analogous in the reactions they induce.

Let me now sketch a few of the conditions that present themselves to the general practitioner and the way we might consider these diseases properly treated if we make use of this added tool in our armamentarium, namely, physical therapy.

First of all, in diseases of the nervous system, paralysis and injuries to peripheral nerves respond more readily to interrupted galvanism and static electricity than any other means available. Herpes has practically no regular medical treatment but can be distinctly benefited by the use of ultraviolet light and static electricity. Neuritis, either brachial or sciatic, is considered by many to be a secondary symptom caused by a myositis either of the infraspinatus or gluteal muscles, and if we treat these muscles as though they had a true myositis, with light or diathermy according to the location, *followed*

by static electricity, we can generally count upon a good result.

Some writers have dwelt on the efficiency of physical therapy in the treatment of tabes dorsalis, but beyond very temporary relief from the girdle pains, I am sure we can do nothing that will benefit this condition.

In disorders of the skeletal muscles, such as myositis, contusions and ruptures, we have for the first two conditions almost specific remedies in light and static electricity. Where there is a rupture of the muscle we do not care to increase the tear and consequently very mild massage or hydrotherapy has a better effect.

Circulatory diseases present many different conditions, some of which react well to physical therapy while others are entirely unaffected. In the treatment of hypertension, high frequency electricity administered as autocondensation really has a good result in relieving the patient of symptoms and it generally can be counted upon to reduce the pressure, which frequently is necessary in the general medical management of the patient. If the hypertension has gone on to apoplexy, the use of galvanism and high frequency electricity through the brain very frequently hastens a resolution of the condition and quickens the restitution of function of the peripheral parts affected.

Some writers claim great effects from high frequency in sclerotic conditions of arteries and in angina pectoris. I cannot give any definite experiments in the treatment of these conditions because, having been trained as a medical man, I have always felt that even though medical treatments are not particularly efficacious it is probably best not to tamper with Nature and create a disturbance that might hurry the patient's death. Radiant light alone has great effect on phlebitis. The destruction of telangiectases with high frequency is a satisfying procedure. Ecchymoses and varicose ulcers respond particularly well to the static current when administered as an effluve.

In respiratory conditions I know of no

medicinal remedy that will give the relief that diathermy will when administered through the chest. This applies to bronchitis, both acute and chronic, pneumonia and even asthma. I do not believe there is any specific action of the high frequency current on the pneumococci but when we produce heat within the tissues by means of diathermy, the body will always attempt to dissipate the heat by forming a physiological hyperemia. I am of the opinion that it is the induction of this hyperemia that gives the patient relief and possibly an increased resistance to the infection.

There are few gastrointestinal conditions in which physical therapy can be of service. It is very probable that a few cases of slight inflammation of the gall bladder or appendix may be benefited by the physiological hyperemia above referred to and induced by means of diathermy. However, I still believe that a troublesome appendix is always a menace until it is removed and I am always loathe to attempt treatment of such conditions with physical therapy. Consequently my experience in the possible benefit referred to in some of the over-enthusiastic literature is very limited. There are hyperenthusiasts who claim that the counterirritation produced by large doses of ultraviolet light have a beneficial effect upon gastric ulcers. This is open to question. I do, however, feel that the use of low voltage wave currents is a particularly efficacious means of overcoming intestinal atony and it is surprising to see how soon many chronically constipated patients will respond to a course of treatments with this kind of current and, with slight cooperation, are able to overcome their constipation.

Diseases of the urinary system, especially those from the bladder up that are purely medical, frequently are helped by the induction of a hyperemia such as we can effect with diathermy.

Kolischer<sup>1</sup> has written on the treatment

<sup>1</sup> Kolischer, G. Diathermy in medical kidney disease. *Arch. Physiotherap., X-Ray, Radium*, Omaha, Oct., 1926, vii, 601.

of different forms of nephritis with diathermy. Cystitis is frequently helped by diathermy; and infections of the prostate, when mild, can be benefited by this same modality. In so-called hypertrophy of the prostate, static electricity is particularly beneficial and it is surprising to see how soon the polyuria is overcome.

I shall not dwell upon the treatment of gonococcal infections with diathermy. Cumberbatch, of St. Bartholomew's Hospital, London, has written a book on the subject of these conditions in women that is particularly instructive, and the technique of his treatments is not very difficult to comprehend or to master. In cases of gonococcal infection in the male, physical therapy, and more particularly diathermy, have been most disappointing. Cherry of New York reports successful treatments of pyosalpingitis with diathermy.

In malpositions of the uterus the low

voltage wave currents are very effective but I think the static current is more so. Both stimulate the muscle of this organ and help it to assume its normal position in a physiological way. I might also mention that there is no treatment I have heard of for subinvolution that can produce as good results as static electricity. Infantile uteri can be stimulated to normal growth, it is claimed, by the use of the galvanic current and one may perform curettage of the cervical endometrium with positive galvanism without hospitalization.

Physical therapy is of distinct help to surgeons and in the regular treatment of fractures there is nothing that helps the patient to return to his work like the judicious use of massage and exercise during the healing and postsurgical stages. Radiant light is of great service in the treatment of burns.



#### [SURGICAL SUGGESTIONS]

THE advantages of approaching a femoral hernia from above, i.e., through the inguinal canal, have been much exaggerated. Attacked from below, the sac may be tied off so high that the stump recedes well within the abdomen; and sutures approaching Poupart's ligament to Gimbernath's and to the pectineus fascia can be put in the same place as by the inguinal route. The latter operation, while not at all difficult, is more complicated and runs the risk of weakening the inguinal canal.

A SICKLE-SHAPED incision curving downward medial to the protrusion is a convenient one for approaching a femoral hernia.

# IODINE HYPERTHYROIDISM\*

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**D**URING the past decade two remarkable advances have been made in checking the progress of goiter, and it is significant that these achievements have been accomplished in our own country. It is an indication of the forward trend of America in the field of medical science. Our colleagues are awaking to the goiter menace, and the problem is no longer of merely local, but of national interest. The East and the Far West have joined the Central States in the study of this question.

The splendid work of Marine, Lenhart and Kimball in formulating an organized plan of goiter prevention and of Plummer in proving beyond a doubt the value of iodine in the treatment of exophthalmic goiter is a tribute to American medicine. While the value of iodine in the therapy of goiter has long been recognized, the literature did not contain sufficient data to warrant its present usage until these workers brought forth their ideas.

Iodine was in such popular vogue in the treatment of goiter during the latter part of the past century that occasional harmful effects were noticed. As a result Kocher called attention to this danger and warned against the promiscuous use of iodine in the care of goiter. Because in many ways the harmful effects simulated exophthalmic goiter or Basedow's disease, Breuer called this syndrome iodine-Basedow. The warning of various observers against the use of iodine, and the erroneous association of hyperthyroidism induced by iodine with the clinical picture of exophthalmic goiter, resulted in a widespread fear of the employment of iodine in the latter condition. A study of the literature reveals the reports of many supposed cases of exophthalmic goiter brought about through the misuse of

iodine. Even today this view is upheld in many European countries.

This misconception retarded the discovery of a valuable therapeutic measure. So firmly fixed was the idea that only six years ago the use of iodine as a skin antiseptic preparatory to operation was abandoned in several of our largesurgical clinics. In 1924 I reported a series of 18 cases, in which hyperthyroidism had developed in non-toxic adenomas of the thyroid, after the indiscriminate use of iodine. Since this condition was always associated with adenomatous goiter, I felt that the term "iodine-Basedow" was misleading, as we consider Basedow's or Graves' disease as exophthalmic goiter. Inasmuch as the pathological picture and the clinical findings were markedly different from exophthalmic goiter, these two toxic conditions could not be placed in the same classification.

In 1913 Plummer and Wilson clearly differentiated between the clinical and pathological findings of exophthalmic goiter and of toxic adenoma. This differentiation, while not generally accepted, is rapidly gaining recognition in this country and abroad. Thus Plummer recognizes two toxic forms of goiter, exophthalmic and multiple toxic adenoma, or adenoma with hyperthyroidism. To the committee on nomenclature I wish to present for their approval a further differentiation of toxic goiter, and suggest the following classification:

Non-Toxic	Toxic
1. Colloid	1. Exophthalmic
2. Adenoma	2. Adenoma
	a. Toxic
	b. Iodine hyperthyroidism

\*Read at the Annual Meeting of the American Association for the Study of Goiter, Philadelphia, January 31, 1927.



It has seemed to me that the term iodine hyperthyroidism is appropriate because this is a form of hyperthyroidism induced in a previously non-toxic adenomatous goiter by the indiscriminate use of iodine. This condition cannot truly be termed iodine-Basedow for reasons previously stated, nor can it be classified as merely toxic adenoma. Recently I reported a series of 50 cases of iodine hyperthyroidism in which the clinical symptoms were shown to differ clearly from those of toxic adenoma. This work has received the support of several clinicians in this country, notably Kimball, who has reported a large series of cases. When this subject was presented at the 1925 alumni meeting of the Mayo Foundation, Plummer was willing neither to accept nor reject the recognition of iodine hyperthyroidism as a distinct clinical entity.

I believe that toxic adenoma as described by Plummer does not exist in persons under thirty years of age. In the group of cases here discussed, many of the patients are under thirty years of age. Everyone of these gave a history of having a non-toxic adenomatous goiter until hyperthyroidism developed from the use of iodine. Cases of exophthalmic goiter in which multiple adenomas are associated may be commonly observed and need no discussion.

The characteristic symptoms indicating that iodine hyperthyroidism should be distinctly separated from exophthalmic goiter and toxic adenoma may be summarized as follows: this syndrome occurs only in persons with adenomatous goiters, and although it may develop in children or the aged, it appears at an average of thirty-seven years. In this respect it simulates exophthalmic goiter. Likewise, tremor, nervousness, loss of weight, tachycardia, loss of strength and insomnia occur as in the other forms of hyperthyroidism. The onset of symptoms also resembles that of exophthalmic goiter because of its short duration, averaging about four months. There is a peculiar type of restlessness and nervousness suggesting this disease,

but in severe cases these symptoms are more marked. The patient gives little or no cooperation, and the condition progresses to actual delirium. There may be a rapid loss of weight as in exophthalmic goiter, but the characteristic ravenous appetite is never seen. Two patients in this group lost more than 50 pounds in two months. In none was the presence of thrills or bruits noticed, a symptom of great diagnostic importance in Graves' disease. In the latter condition the finding of a normal or slightly elevated systolic pressure and a low diastolic pressure is of considerable significance. Toxic adenoma is characterized by a hypertension and a proportionately high diastolic pressure. The blood pressure findings in iodine hyperthyroidism are not of diagnostic value. The systolic pressure may be considerably elevated, a low diastolic pressure is not seen. Tachycardia is synonymous with toxic goiter. In iodine hyperthyroidism, the pulse rate is often extremely rapid, and the cardiac pulsations such as to give an impulse to the entire body. Digitalis is of little value in slowing the pulse. Exophthalmos has never been observed in these cases.

In toxic adenoma there is a gradual onset of symptoms of several years' duration before the patient comes to operation, in contrast to the rapid onset of symptoms as noted in the other two forms of toxic goiter. In exophthalmic goiter, hyperthyroidism develops by a series of waves of increasing severity followed by periods of remission, in toxic adenoma there is a slow steady progress of the disease, in iodine hyperthyroidism there is a rapid onset, the duration and severity depending partly upon the dosage of iodine. Toxic adenoma is a steadily progressing condition, whose course can only be checked by surgical removal of the goiter. Early cases of iodine hyperthyroidism may be aborted by prompt withdrawal of the drug and the institution of the proper medical measures. Once the disease has advanced surgery alone can effect a cure. One case resisted all medical

## MEDICAL AND SURGICAL RESULTS IN TREATMENT OF IODINE HYPERTHYROIDISM

Case No.	Sex	Age	Iodine, months	Prescribed by	Basal metabolic rate per cent	Loss in weight, pounds	Treatment	Basal metabolic rate on discharge per cent	Gain in weight
32444	F.	65	3	Physician	+20	10	Thyroidectomy	+5	40
32860	F.	28	5	Physician	+17	12	Thyroidectomy	+1	24
31732	F.	30	2	Physician	+20	25	Thyroidectomy	+4	8
29894	F.	36	3	Physician	+44	20	Thyroidectomy	+10	25
35220	F.	27	3	Surgeon	+22	15	Medical	+4	5
33663	F.	53	2	Physician	+20	30	Thyroidectomy	+0	50
33275	F.	23	2	Internist	+16	8	Thyroidectomy	+4	14
34808	F.	35	2½	Quack remedy	+31	13	Thyroidectomy	+8	22
29598	F.	50	3½	Specialist	+46	15	Thyroidectomy	+4	18
34592	F.	32	4	Quack remedy	+24	10	Medical	+8	12
35087	F.	40	3	Physician	+18	30	Thyroidectomy	+4	16
35365	F.	52	4	Physician	+51	50	Thyroidectomy	+5	51
35280	F.	52	3	Physician	+30	25	Thyroidectomy	+6	24
35351	F.	35	2	Quack remedy	+26	14	Thyroidectomy	+3	20
36687	F.	38	4	Physician	+28	8	Thyroidectomy	+5	20
36589	F.	28	3	Physician	+28	10	Thyroidectomy	+5	13
38914	F.	22	3	Physician	+30	10	Thyroidectomy	+6	10
40173	F.	47	2½	Physician	+52	13	Thyroidectomy	+10	25
39915	F.	45	3	Physician	+55	13	Thyroidectomy	+0	10
42044	M.	64	3	Quack remedy	+67	51	Thyroidectomy	+8	42
42282	F.	38	4	Physician	Too sick	53	Thyroidectomy	Died	
42959	F.	49	4½	Physician		35	Medical	Died	
39042	F.	27	8	Quack remedy	+47	13	Thyroidectomy	+2	13
39419	F.	30	2	Druggist	None	5	Medical	—	—
39882	F.	30	12	Physician	+40	0	Thyroidectomy	+0	15
41177	F.	41	1	Physician	+20	10	Thyroidectomy	+3	10
41288	F.	39	2	Physician	+25	0	Thyroidectomy	-3	5
40064	F.	49	1	Physician	+18	18	Thyroidectomy	-8	30
30262	F.	27	2	Relative	+57	15	Thyroidectomy	+3	9
41412	F.	14	3	Physician	+24	10	Thyroidectomy	0	16
27035	F.	36	3	Physician	+24	6	Thyroidectomy	+7	5
41278	F.	25	4	Physician	+28	8	Thyroidectomy	+4	6
40586	F.	14	3	Quack remedy	+46	20	Thyroidectomy	+11	25
31596	F.	16	8	Author	+21	6	Medical	+5	6
31106	F.	38	12	Physician	+46	20	Thyroidectomy	+7	30
38730	F.	27	2	Physician	+18	5	Medical	—	—
34973	F.	24	3	Physician	+17	No	Medical	—	—
43804	F.	48	3	Physician	+43	30	Thyroidectomy	+10	20
43842	F.	56	4	Physician	+26	15	Thyroidectomy	+3	—
44234	F.	46	3	Physician	+20	46	Medical	—	—
44406	M.	66	12	Quack remedy	+19	45	Medical	+5	15
45403	F.	54	6	Physician	+35	73	Thyroidectomy	—	40
45250	F.	29	6	Physician	+28	17	Thyroidectomy	+17	25
44680	F.	47	7	Physician	+60	30	Thyroidectomy	0	1
44301	F.	17	7	Physician	+44	25	Thyroidectomy	+2	22
46670	F.	23	3	Physician	+38	7	Thyroidectomy	+3	11
40704	F.	23		Physician	+17	No	Thyroidectomy	+5	12
46654	F.	12	3	Physician	+25	14	Medical	—	—
45429	F.	39	7	Quack remedy	+23	15	Thyroidectomy	0	—
35704	F.	65	6	Physician	Too sick	35	Medical	Died	
50487	F.	51	12	Physician		21	Thyroidectomy	+13	1
18389	M.	48	6	Physician	+34	20	Thyroidectomy	+6	—
48724	F.	23	6	Physician	+18	3	Medical	—	—
35367	F.	35	5	Physician	+41	25	Thyroidectomy	+6	41
Averages		37	4		+33	21		+5	19

treatment, could not be operated upon, and the patient died three days after admittance. Three cases have terminated fatally, one following an attempt at surgical relief.

A study of the basal metabolic rate of these patients showed an average of plus 33 per cent as compared with plus 29 per cent in a group of cases of toxic adenoma and plus 54 per cent in a series of cases of exophthalmic goiter.

The great awakening of interest that has been developed in the prevention and treatment of goiter by Marine, Kimball and Plummer should likewise carry with it a note of warning. I have always maintained and am continuing to do so, that iodine is a drug and not a food and should consequently be administered not under the direction of grocerymen but of physicians. Moreover, there is still some doubt in my mind as to the actual effectiveness of iodine in the prevention and treatment of goiter. I have been studying a considerable group of children for several years, and while I am not prepared to enter into a discussion of the subject at this time, I can say that the results obtained in the actual treatment of colloid goiter with iodine have been disappointing. Without attempting to reflect in any way upon the splendid achievement or hinder the work that has been done, I believe that we should concentrate upon a safe and sane plan of prevention, while seeking further for more

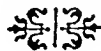
satisfactory methods of treatment. The promiscuous sale and distribution of iodine should be discouraged. Patent medicines were responsible for 7 of the cases in this series. Eight were patients of the same physician. Lugol's solution of iodine caused 6 of the cases including the 3 that terminated fatally.

Space will not permit a discussion of the pathology or of the treatment and prognosis. Three of the patients here reported were cured by medical means; 3 died in spite of all forms of treatment; the remainder were cured by thyroidectomy. The mortality was considerably higher than in a similar number of cases of exophthalmic goiter and toxic adenoma. All the patients in this series that responded to treatment made a good recovery.

To the cases reported in a previous paper I wish to add 4, making a total of 54.

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# SOME COMPLICATIONS & THEIR PREVENTION IN GOITER SURGERY\*

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PROBABLY in no branch of surgery is it more important to realize fully the complications and undesirable, sometimes disastrous, sequelae that may follow operation than in surgery of the thyroid gland. To avoid these, a thorough knowledge of the present conception of its diseases and their surgical treatment is paramount. Operations on the thyroid gland for goiter in some form, more particularly the severe types of hyperthyroidism, open the door for complications which when they occur sometimes at least should have been prevented. Many of these complications can be prevented if we answer correctly the following two questions:

1. When shall we operate (including the preparation of the patient)?
2. What shall we do (including the technique of the operation)?

The period of time in the patient's disease chosen for operation is one of the most important steps in the management of hyperthyroidism. In exophthalmic goiter if the patient is seen within the first few months of the disease, before iodine in some form has been administered carelessly over an indefinite period of time, the patient in question will usually be in good condition for operation in from seven to twenty days by the use of Lugol's solution, rest and proper feeding. The improvement which follows such treatment so consistently must not be overlooked as this is the time to undertake operative procedures which usually can be carried out very safely indeed. Unfortunately, many cases of this disease have undergone

iodine administration for weeks or months in other hands and have passed the period of improvement during which operative measures should have been carried out. The condition of this type of case having become aggravated by the prolonged use of the drug fails to respond to its further use.

I would like to make a plea for the more rational use of iodine in the treatment of exophthalmic goiter and to suggest that until surgical treatment has been decided upon the drug should not be used in this disease.

For more than two years I have been using Lugol's solution in the preoperative care of toxic adenomas; and I<sup>1</sup> have found that five to ten minims of this drug twice daily for five to ten days before operation seem to aid considerably in the improvement of the patient who, I feel, withstands operation better than without its use. These findings have been borne out by Graham.<sup>2</sup>

Operation late in the disease is a factor which weighs heavily in favor of complications and unsatisfactory late results. It is in such cases as these that we find diseased and enlarged hearts often accompanying massive vascular goiters, a bad combination, which means a big operation often technically difficult on a patient with a heart quite unfitted to resist the extra strain entailed, accompanying as it does the many other grave disorders characteristic of this disease. These are the cases which tend to swell one's mortality rate and which, it must be recognized, should have been operated on much earlier in the disease. The fault is not always the

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patients', as in some instances they have been carried for months or years under some form of treatment or observation by physicians, being advised to seek surgical treatment only after they have gradually drifted into a critical condition. It might be said by some that patients presenting themselves with large goiters, marked enlargement of the heart, often fibrillating, tachycardia and manifestations of failing circulation, marked loss of weight, high basal metabolic rate, etc., should be refused operation. If we analyze such a statement by our experience we will find, I think, that such advice is not sound. We know that most of such cases if not relieved of the goiter will steadily go down, often dying of congestive heart failure, whereas many such cases in the past have been successfully operated on and have made very satisfactory recoveries to such an extent as to be able to resume their previous occupations. These "bad risk" cases need careful handling often over a long period of time, for surgery cannot withhold what it has to offer, even if such practice entails an increase in operative mortality.

Let us suppose that in a series of 200 consecutive thyroidectomies we find 20 such "bad risk" cases. It is very probable that the deaths will be found among the last group mentioned. If the surgeon loses 4 or 5 or even more of these (an average mortality of 2 per cent to 2.5 per cent) he is to be commended much above the surgeon who refused to operate on the 20 bad cases but did the remaining 180 cases without a death. In such an example as this, the latter surgeon's mortality should be based on the end-results of the cases he refused to consider surgical.

The answer to all this is early operation, and to this end the medical profession should be taught the danger of procrastination of an indefinite character in all cases of hyperthyroidism, whether primary or secondary.

The postoperative morbidity in the form of an incomplete cure depends chiefly on two factors:

1. The duration of the disease before operation.

2. The amount of diseased tissue removed at operation.

All forms of hyperthyroidism enjoy a more complete cure the earlier they are operated upon. Radical resection of the goiter, more particularly in the exophthalmic type, predisposes to early and complete cure.

A note of warning might be sounded in the extremely radical operation for exophthalmic goiter where Lugol's solution has been administered before operation. Cattell,<sup>3</sup> Reinhoff,<sup>4</sup> and I<sup>1</sup> have shown that when Lugol's solution is administered in exophthalmic goiter there is a reversion of the gland to a form more of the colloid type of goiter. This being the case, it follows that a given amount of thyroid tissue would be less potent after the use of iodine therapy than before and for this reason probably a slightly less radical operation should be done on lugolized cases than on cases not so treated. In my earlier experience with Lugol's solution, I performed my usual quite radical operation and found in a number of cases that the patient swung from a severe degree of hyperthyroidism before operation to a definite degree of hypothyroidism a few weeks after operation. In each case, however, the thyroid function gradually became balanced some months later. Since this experience, however, I have endeavored in such cases to leave slightly more thyroid tissue in front of the posterior capsule of the gland than would otherwise have been the case. This, however, must not be an excuse for leaving enough thyroid tissue to cause a persisting degree of hyperthyroidism and to make probable a recurrence of thyroid hyperplasia which was commonly seen in the earlier days of incomplete operations but now seldom seen following a radical operation.

#### TETANY

Removal of, or severe injury to the parathyroid glands may cause a very grave

complication in the form of tetany. Rabinowitch<sup>5</sup> has shown that following thyroidectomy the blood calcium very commonly decreases temporarily, which would suggest that the trauma incident to the operation inhibited for a time the function of the parathyroid gland, but very seldom to a degree sufficient to cause the manifestations of tetany.

I have in mind a young woman in the third decade of life on whom I did in April, 1926, a bilateral resection of the thyroid gland for exophthalmic goiter. During the operation I demonstrated to the assistants and two physicians who were spectators, tissue which appeared to be the right lower parathyroid body, and during the steps of the operation due care was taken to preserve its blood supply and avoid trauma to its structure. Twenty-four hours after the operation, the patient complained of a sense of extreme weakness and numbness and stiffness of hands; when I saw her twenty minutes later she presented a typical picture of tetany. She was very excited and felt sure she was going to die. Her hands presented the characteristic obstetrical hand appearance. The feet and toes were affected to a lesser degree. Morphine, one-quarter grain, hypodermatically was administered and large doses of calcium lactate given by mouth. In thirty minutes the spasm had diminished considerably and six hours later had entirely disappeared. For a few days calcium salts were administered with a diet high in calcium but no further manifestations of tetany developed.

One month ago, just eight months following the seizure, I had the opportunity of examining this patient. She had entirely recovered from any evidences of exophthalmic goiter and her blood at this time showed 9.8 mg. calcium per 100 c.c. The fact that in this case one of the parathyroid bodies was visualized and avoided at operation followed twenty-four hours later by a typical seizure of tetany which disappeared in six hours not to recur again, goes to show that it is not necessary to

remove the parathyroid bodies in order to have symptoms of tetany develop. Should the spasms have persisted, the use of Collip's<sup>6</sup> parathyroid hormone would have been indicated. This case and one other more persistent type are the only manifestations of this disease which I have seen in the last 600 cases of thyroidectomy, for the various surgical forms of goiter met with.

#### GLYCOSURIA AND DIABETES MELLITUS

The lowered sugar tolerance so commonly described in exophthalmic goiter seems to be found quite commonly too in toxic adenoma and it is sometimes difficult to differentiate between the glycosuria of hyperthyroidism and that of true diabetes mellitus accompanied by hyperthyroidism.

In the presence of hyperthyroidism, a glycosuria or hyperglycemia can be said to be due to diabetes mellitus when the respiratory quotient does not appreciably increase after the usual meal of 100 gms. of glucose under basal conditions and when the arterial blood sugar is higher than the venous blood sugar, except in very severe forms of diabetes when the contrary may be found.

The following case history is interesting from the point of view of non-diabetes glycosuria and hyperglycemia in the surgical care of hyperthyroidism:

Mrs. W., aged fifty-six years, presented herself July, 1926, complaining of a large goiter, loss of 35 pounds in weight, and great loss of strength, shortness of breath on mild exertion, nervousness and irritability. These symptoms had first been noticed one year before and had gradually become more severe, the goiter however having existed some twenty-five years. Examination revealed a rather frail woman with a large adenomatous goiter more marked over the left side. A tremor of fingers, moist skin, heart not appreciably enlarged, regular and rate 104 per minute, blood pressure 170/95, basal metabolism plus 28 per cent. Sugar present in the urine. Diagnosis: toxic adenoma of thyroid gland with lowered sugar tolerance.

After the usual preparatory measures on

July 21, 1926, under gas oxygen and local anesthesia, I resected this large goiter. Forty-eight hours after operation, patient seemed somewhat dull and apathetic and said she felt weak and tired. The following day she was definitely stupid and her breath had the "sweetish" odor of acidosis. Her blood sugar was estimated and proved to be 600 mg. per 100 c.c. of blood. Acetone and diacetic acid were present in the urine. Glucose and insulin treatment was immediately begun by an associate internist and in four days her blood sugar was quite normal and the urine was sugar free. Ten days later, this patient was sent to her home in a neighboring province with instructions as to how she should take care of herself and also with a note to her physician who was to supervise her progress. Five months later, I received a report from the patient to the effect that she was in first class condition, had regained her lost weight, and had been taking a full diet and although her urine had been examined repeatedly there had at no time since her return home been any evidence of the presence of sugar.

Such an increase in blood sugar following operation as was noted in this case would suggest the existence of a true diabetes mellitus, but the entire absence of any evidence of this disease for so many months following removal of the goiter is I think conclusive evidence that it never existed.

In all cases of glycosuria complicating hyperthyroidism I would recommend the careful study of the blood sugar especially during surgical treatment and the early application of insulin therapy to control increasing sugar concentration of the blood.

#### TECHNIQUE

There are many other complications of

thyroid surgery some of which are the direct result of bad technique. Primary hemorrhage can best be prevented by developing a technique which will securely occlude the chief arteries to the gland, the superior and inferior thyroid arteries. A dry wound after the patient has coughed or strained should be secured before closure is proceeded with.

Injury to the parathyroid bodies and the recurrent laryngeal nerves is also best avoided by a technique which carries the line of incision through the thyroid on a plane just anterior to that in which these structures lie. By keeping just in front of the posterior capsule the most radical form of operation required for hyperthyroidism may safely be carried out. The avoidance of such a tragic complication as a severe and persistent form of tetany or a bilateral abductor paralysis of the vocal cords sometimes entailing a tracheotomy is well worth considerable effort in cultivating such a form of technique.

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# PREOPERATIVE IODINE THERAPY IN TOXIC GOITER

## INDICATIONS AND LIMITATIONS\*

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THE purpose of the present paper is to discuss the use of iodine as a measure preliminary to operation in cases of toxic goiter. The indications for and limitations of this drug will be particularly emphasized. It may be well to state at the outset what I conceive to be the object of the iodine therapy, so far as the surgeon is concerned. Iodine is given not with the intention of curing the disease, but for the purpose of bringing about a state in which an operation can be performed with the greatest safety to the patient. The efficacy of preoperative iodine therapy may be a matter of doubt, if not frank scepticism, in the minds of some of our surgeons. To these it may be permissible to suggest that disappointment is more likely to result from an inadequate than from a too vigorous preoperative use of the drug.

No doubt the surgical treatment of patients with toxic goiter may be practiced, with a goodly measure of success, by surgeons of extensive experience and sound clinical judgment, without recourse to iodine. It is questionable, however, whether anyone who has used iodine consistently and thoroughly would be willing to be deprived of the advantages of this therapeutic aid.

In view of our present limited knowledge, it is necessary to base our interpretations of the effects of iodine upon purely empirical methods. The fact that we are unable to define precisely the mechanism that governs its action does not lessen our obligation to employ an agent whose bene-

fits have been abundantly proved by clinical experience. Clinical observations are valuable in proportion to the experience of the observer, the care with which the observations are made and the broadness of vision with which the problem is approached.

In 1869 and again in 1874, Cheadle<sup>1</sup> reported series of cases of exophthalmic goiter and made the following observation: "Be the explanation what it may, the fact remains that the only decided result obtained by treatment in any of this series of cases followed the administration of tincture of iodine, as in the preceding series of 1869." In 1911 Marine and Lenhart<sup>2</sup> published their observations on exophthalmic goiter. These authors noted clinical improvement following the administration of iodine and described the effects of the iodine upon the thyroid gland, namely, the involution of the hypertrophy and hyperplasia to the colloid or resting state. Moreover, they noted a lower post-operative mortality rate in the patients whose thyroids approached the normal gland in regard to histological changes and iodine content. They state: "In our opinion operations should not be undertaken until the thyroid has returned to its colloid or resting state, whether this has occurred spontaneously during the general treatment or has been hastened by the action of minute doses of iodine." In 1923 Plummer and others<sup>3</sup> at the Mayo Clinic made extensive observations on the preoperative use of iodine in cases of exophthalmic goiter. They pointed out

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the advantages of this measure, and deserve credit for establishing the procedure upon a practicable basis.

During the past three years the observations of the foregoing authors have been amply confirmed. At the same time it has been noted by various writers that in a certain percentage of cases clinical improvement following the administration of iodine is negligible, and in some instances the condition has been aggravated by the iodine. It is desirable to know why these exceptions to the rule occur. What is it that determines whether the response will be favorable, negligible or adverse? Although this question cannot be answered with any degree of finality at the present time, there are certain important factors that influence the response. Fortunately these can be evaluated clinically and may well serve as guides in the management of our cases until more reliable criteria are proposed.

To avoid repetition, I may state here as my conviction, that any advantages claimed for or disadvantages attributed to the use of iodine in cases of toxic goiter, apply with equal validity whether the thyroid be adenomatous or non-adenomatous; whether the clinical diagnosis be exophthalmic goiter or so-called toxic adenoma. The reasons for this conclusion have been given in previous publications.<sup>4</sup>

#### INDICATIONS FOR THE ADMINISTRATION OF IODINE

There is but one indication for the administration of iodine to a patient with toxic goiter, namely, the presence of active hypertrophy and hyperplasia of the thyroid gland. The degree of hypertrophy and hyperplasia depends upon a number of variable factors, among which may be mentioned: the age, size and physical state of the patient; the duration and severity of the disease; the quantity of iodine delivered to the thyroid in assimilable form; the period of time during which the iodine is available; the size, character and iodine content of the thyroid at the onset of the disease.

The importance of a correct estimation of the factors just enumerated cannot be too greatly stressed, since it is these that determine the degree of active hypertrophy and hyperplasia present at a given moment in a given case, and this in turn determines the quantity of iodine that will be tolerated with benefit, or at least without harm.

In the present discussion, assuming that surgical treatment is the method of choice, and assuming further that complications such as cardiac decompensations, auricular fibrillation, acidosis, hyperglycemia and hypoglycemia, active infection, pregnancy, etc., will be treated in accordance with the usual indications in each case, it may be useful to consider cases of thyrotoxicosis in two categories, namely, those that have not and those that have had previous iodine therapy.

*Cases that have had no iodine previously.* The most striking improvement has occurred in well-developed cases of toxic goiter of short duration, with or without exophthalmos, but with uniform diffuse thyroid enlargement, with well-defined thrill and bruit, the thyroid being soft in consistency. With rest in bed, high caloric diet, and Lugol's solution (or other suitable preparation of iodine) such cases invariably, in my experience, have shown a decided improvement, manifested by a decrease in the nervousness, flushing, sweating, palpitation, tachycardia, and a corresponding decrease in the basal metabolic rate. With the improvement in the clinical condition the thyroid becomes firmer and in time may become quite hard; the thrill disappears, the bruit diminishes in intensity and duration and finally also disappears. The change from the soft vascular thyroid with thrill and bruit to the firmer or hard gland without thrill or bruit is the result of the storage of iodine and colloid material in the organ. I have gained the distinct impression that the greatest advantage occurs when the hypertrophic and hyperplastic thyroid is involuted to the colloid state by comparatively large doses of iodine in a comparatively short

period of time. Moreover, there seems to be an advantage in beginning the iodination during the first few days of hospitalization rather than in the second or third week after admission.

Cases such as I have just described constitute the most favorable group from the standpoint of the surgeon. With adequate preparation a primary subtotal thyroidectomy is a safe procedure in most instances. Occasionally it may be found necessary to resort to ligations or hemithyroidectomy.

In contrast to the early and moderately advanced, though favorable cases, are those in which the disease has been established for years, and in which periods of remission have been followed by periods of exacerbation. Many of these cases seek relief from the complications of the disease rather than from the disease itself. The general course of the disease as judged by the basal metabolic rate is on a lower level than obtains in the more favorable group. The thyroid may be neither visibly nor palpably enlarged; it is usually hard and frequently cirrhotic; frequently there is no thrill and there may be absence of bruit. In spite of the smallness, hardness and absence of thrill and bruit, the thyroid in such a case may be expected to show hypertrophy and hyperplasia, provided iodine has not been taken within the few months immediately preceding the first observation. The quantity of iodine necessary to effect a maximum clinical improvement in these cases is less than that required in the more favorable group. The indications for its use, nevertheless, are the same, namely, hypertrophy and hyperplasia of the thyroid. The extent of operative intervention in such cases cannot always be formulated in advance; it must be determined by the clinical experience and judgment of the surgeon in each instance.

*Cases that have had iodine previously.* The patient with thyrotoxicosis who has had iodine, either as a therapeutic agent or as iodized table salt, coming under the

observation of the surgeon for the first time, presents a problem quite different from that of the patient who has had no iodine. So far as the preoperative preparation by iodine is concerned the indications are the same, but the favorable and striking improvement noted in previously untreated cases often is not obtained. These are the cases that require the greatest consideration on the part of the surgeon in regard to diagnosis, surgical intervention, and prognosis.

It is not sufficient to know the mere fact that the patient has had iodine before coming under observation. It is advantageous to know the amount of iodine, the period of time during which the drug has been taken, the interval that has elapsed since the last dose, whether the average daily intake was relatively large or relatively small. It is equally important, from a careful consideration of the patient's clinical history, to estimate as nearly as possible the intensity and duration of the disease and the condition of the thyroid gland at the beginning of the iodine treatment. The estimation thus arrived at, when compared with our clinical evaluation of the patient's state on first coming under observation, furnishes an index of the possible benefits to be expected from iodine as a preoperative preparation. In spite of most earnest efforts we are doomed to disappointment in a certain percentage of cases, and unfortunately we cannot tell which cases until we have carried out the clinical experiment of administering iodine. We need not persist in the treatment if improvement does not follow soon.

While the most favorable cases, from the standpoint of surgical intervention, are those that come to the clinic without the previous use of iodine in any form, the fact that iodine has been administered or taken does not necessarily rob the surgeon of his opportunity to avail himself of this valuable aid. With a free interval of one year, six months, and even three months in most cases, previous iodine therapy can be disregarded so far as its resumption as a

preoperative preparation is concerned. I have observed a favorable response with an interval of only three to six weeks in some cases. Irrespective of how much iodine a patient has had it is probably not a safe procedure to discontinue the drug entirely within the period of ten days to two weeks immediately preceding a thyroidectomy.

On admission to the surgical clinic, a correct interpretation of the condition of the thyroid gland is important in cases that have had iodine. Our only means of knowing whether the patient has had iodine, in some cases, is by examination of the thyroid with reference to its size, consistency and vascularity. Patients under treatment may not know what medicine they are taking; the physician may assure us he has not given iodine; but the condition of the thyroid may clearly indicate that iodine in some form has been ingested. There can be no doubt that the long-continued use of iodine can and does materially affect the thyroid gland in the course of a case of toxic goiter. The degree of thyroid enlargement associated with Graves' disease, other things being equal, is distinctly less in patients who have had iodine during the developmental phase of the disease, than in patients who have had no iodine.

The average case of toxic goiter that has had previous iodine therapy usually has not had a sufficient quantity of the drug to nullify its use as a preoperative preparation. Occasionally, however, we do encounter cases that have had iodine in large quantities and for a prolonged period, even to the day of first consultation with the surgeon. These cases, together with those that have had a recent interruption of the iodine therapy, may tax the ingenuity of the surgeon to the limit, since continuation or resumption of iodine may effect very little improvement in the clinical status of the patient and sudden discontinuance of the iodine may be followed by a severe relapse. The condition of such a patient may be desperate; the surgeon

may be forced to do ligation or hemithyroidectomy in a case which otherwise would do well following thyroidectomy. It is astonishing what huge quantities of iodine may be given in these cases without effecting complete involution of the thyroid.

#### LIMITATIONS OF THE USE OF IODINE

It is quite generally agreed, I believe, that iodine is not a cure for toxic goiter in any form, however valuable it may be as a preparation for thyroidectomy. This constitutes its first limitation. While the second limitation is not precisely definable, clinical experience has demonstrated the utter futility of further iodine therapy in the already overiodinized patient. This is a matter over which the surgeon usually has no control; it is to be hoped that he would not deliberately subject his patient to such a disadvantageous regimen. The clinical indications of overiodinization are: increasing consistency of the thyroid, decreasing intensity or disappearance of the thrill and bruit, associated with an increasing basal metabolic rate and persistence or aggravation of the clinical manifestations of the disease.

The third and absolute limitation of iodine as a therapeutic agent in cases of toxic goiter is the presence of a normal or completely involuted (colloid goiter) thyroid. No immediate benefit is to be expected from iodine under such circumstances, irrespective of what the clinical diagnosis may be.

#### SUMMARY

The most favorable response to iodine therapy occurs in patients who have had no previous treatment. The quantity of iodine necessary to effect the maximum clinical improvement is determined very largely by the size of the thyroid and the degree of active hypertrophy and hyperplasia at the time the iodine therapy is instituted. The best clinical index of the degree of hypertrophy and hyperplasia of the thyroid is the consistency and vascu-

larity of the gland. Patients who have had iodine previously show the greatest variations in their response to its use as a preparation for operation. Excess quantities of iodine over prolonged periods of time deprive the patients of the advantages of this otherwise valuable therapeutic aid in preparing them for the operative ordeal, unless there has been an interval of at least one month without iodine before its resumption as a preoperative preparation. Even though the response, in such cases, may not be so favorable as one might hope for, it appears to be a wise procedure to resume the iodine before performing thyroidectomy. Thrill and bruit are sufficient indication for its resumption. If the patient has had sufficient iodine to completely involute the thyroid, its further use is not likely to be beneficial. However, the drug should not be discontinued, in such cases, immediately preceding thyroidectomy. The presence of adenomas in the thyroid is not, per se, a contraindication

to the use of iodine preliminary to thyroidectomy. Even though we do not understand and cannot satisfactorily explain all of the phenomena observed after the administration of iodine, its preoperative use in the surgery of toxic goiter is justifiable, provided we confine ourselves to its beneficial effects and do not transgress its limitations.

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#### [SURGICAL SUGGESTIONS]

IN A femoral hernia the peritoneum is easily drawn down as far as one wants to assure complete removal of the sac. The surgeon should not, however, draw it down so far that he also pulls down and perhaps cuts the bladder.

WHEN operating upon a strangulated intestinal hernia, unless the involved loop of gut shows, upon release, *active* circulation and *lively* peristalsis, it is risky to return it to the abdominal cavity. It happens not infrequently that a strangulated loop giving fair evidence of viability goes on to gangrene after reduction.

# CARDIOSPASM COMPLICATED BY PULMONARY ABSCESS

## A CASE REPORT\*

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Division of Medicine, Mayo Clinic

ROCHESTER, MINN.

**P**ULMONARY symptoms are not uncommon in cases of cardiospasm. The pressure made by a dilated esophagus filled with food may cause considerable dyspnea, even to the point of produc-

ing an unusual complication but because the cardiospasm was cured by dilating the cardia and because the pulmonary abscess resolved following a single bronchoscopic aspiration.

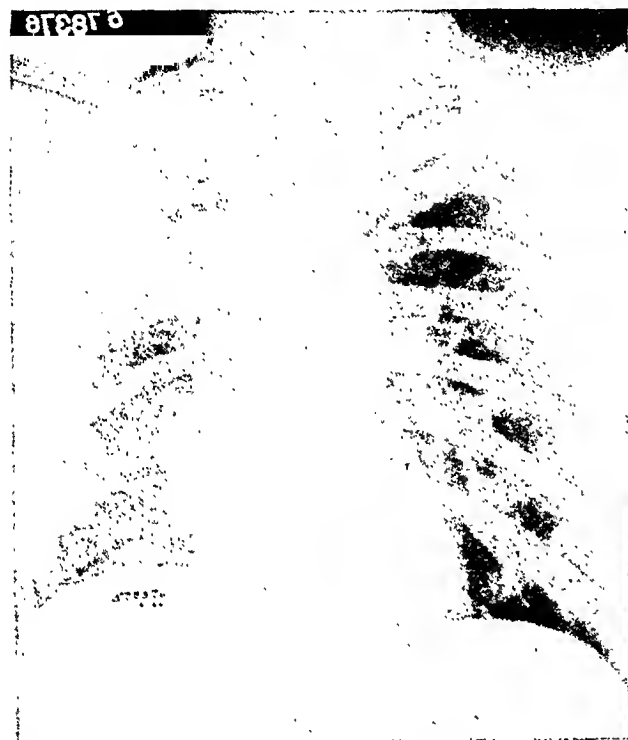


FIG. 1. Large abscess with fluid level in upper lobe of right lung.

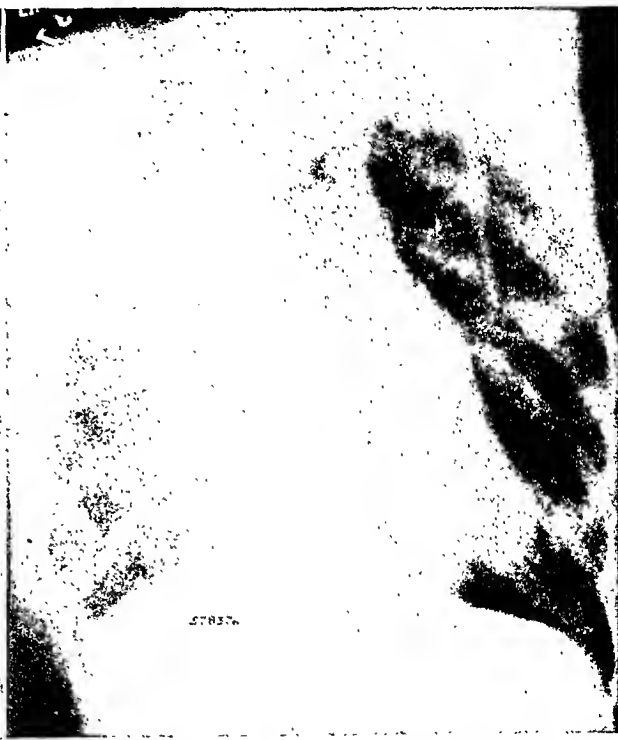


FIG. 2. Cardiospasm with moderate dilatation of the esophagus.

ing attacks simulating those of bronchial asthma. Regurgitation of food and mucus with aspiration is often followed by chronic bronchitis or bronchiectasis.

The following case is one of cardiospasm in which acute pulmonary abscess resulted probably from regurgitation and aspiration of food and mucus. The data in this case are of interest not only because of the

A man, aged forty-two, was examined in the Mayo Clinic November 17, 1926. Ten years previously he had noted obstruction at the cardia to the passage of roast beef, apples and chocolate candy. The dysphagia progressed gradually and there was considerable regurgitation of food and mucus both day and night. There was some epigastric soreness but no pain. About a month before the examination cough and fever developed, and foul, bloody sputum

\* Submitted for publication January 11, 1927.

was expectorated. There had been one definite chill. There had been a loss of weight of 30

The patient was thin and appeared to be suffering from toxemia. The hemoglobin was



FIG. 3. Marked reduction in the size of the abscess cavity.



FIG. 4. Further reduction in the size of the abscess.



FIG. 5. Roentgenogram of chest one month after aspiration of abscess. Abscess has disappeared and only small amount of pulmonary fibrosis and pleural thickening remained.

pounds in one year, and of 12 pounds during the preceding month.

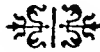
60 per cent and the leucocytes numbered 12,000. The temperature was normal. There



was considerable cough with the expectoration of thick purulent sputum. Roentgenograms of the chest revealed a pulmonary abscess with a large cavity in the upper lobe of the right lung (Fig. 1). Roentgen-ray examination of the esophagus showed cardiospasm with diffuse dilatation of the organ (Fig. 2).

Because of the patient's poor general condition it was deemed advisable to pass sounds through the cardia before the hydrostatic dilator was used, and accordingly a 55 French olive was passed into the stomach. Marked relief from dysphagia and gain in weight and strength followed. Five days later bronchoscopy was performed under local anesthesia and a small amount of pus was aspirated from

an abscess in the upper lobe of the right lung. The opening into the bronchus of the right upper lobe was enlarged as much as possible. Improvement was progressive (Figs. 3 and 4), but because of slight dysphagia the cardia was dilated with the hydrostatic dilator at the end of two weeks. The patient then swallowed without difficulty. When he was dismissed, December 18, the roentgen-ray examination of the esophagus revealed slight lagging of the barium meal at the cardia and the pulmonary abscess had disappeared almost completely (Fig. 5). There was practically no cough and no expectoration. The hemoglobin was 70 per cent and the leucocytes numbered 9100. The patient had gained 15.5 pounds.



#### [SURGICAL SUGGESTIONS]

**I**N THE treatment of paralytic ileus pituitrin is often life-saving. Give it *intravenously*, and repeat it as often as necessary so long as it continues to be effectual. In rebellious cases the pituitrin ceases to be effectual after a few days or fatal toxemia develops in spite of the response to each dose. Eserine is also a valuable excitant of peristalsis. An injection of cholin may work when eserine and pituitrin fail.

**F**OR postoperative tympanites an enema of equal parts of milk and molasses is often promptly effectual. If this or similar clyster fails, do not hesitate to use pituitrin and, to be sure of prompt and maximum effect, inject it *intravenously*.

**I**N some cases of persistent ileus the pylorus becomes so dilated and the duodenum so distended that stomach and duodenum appear as one huge organ. It is in such cases, probably, that jejunostomy offers its best chance of giving relief.

# AN UNUSUAL ABDOMINAL INJURY

## A CASE REPORT\*

HARRY BELLEVILLE EISBERG, M.D., F.A.C.S.

NEW YORK

**A**BDOMINAL injuries, due to crushing forces, produce an infinite variety of lesions. One of the most unusual forms of this type of injury is illustrated by the following case:

P. R., aged eight, colored, was admitted to the accident ward of Harlem Hospital, January

There was no evidence of external injury. There was no distention or rigidity but a slight generalized tenderness was elicited over the abdomen. A fluid wave was present, and on percussion there was flatness in the flanks, with shifting dullness.

Excruciating tenderness was brought forth on slight compression of the pelvic bones. The

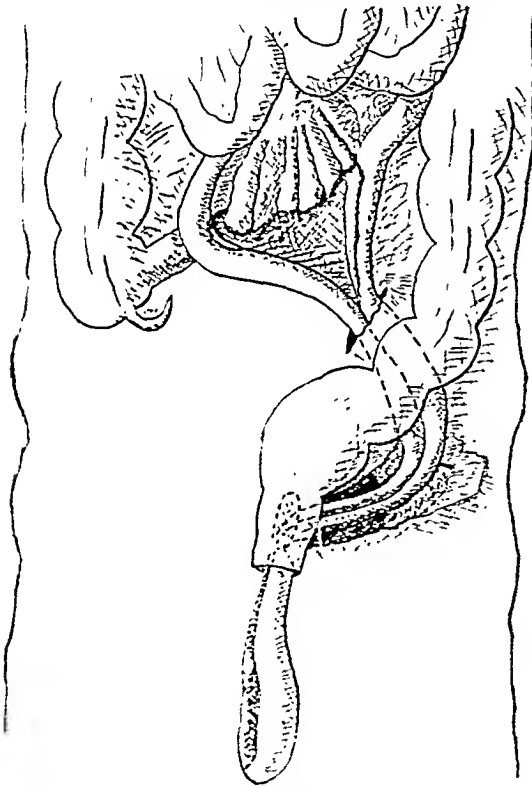


FIG. 1. Diagrammatical representation of the injury described at operation.

19, 1925. The history disclosed that the child was "hitching" on an automobile and fell on his abdomen. It could not be ascertained whether or not he was actually run over.

On admission the child was complaining of pain in the abdomen. He was conscious and in moderate shock. The pulse was 120, regular, of small volume and poor tension.

\* From the surgical service of Harlem Hospital, New York City.



FIG. 2. Post-mortem roentgenogram showing crushing fracture of the fifth lumbar vertebra and fracture through the left acetabulum.

perineum was intact, but there was a protrusion of about 20 cm. of dark-colored small intestine from the anus. The anus itself was not injured.

The temperature was 97° F., pulse 120, respirations 24, blood: red blood cells 4,500,000; hemoglobin 70 per cent; white blood cells 40,000, polymorphonuclears 94 per cent, lymphocytes 6 per cent.

The preoperative diagnosis was made of (1) rupture of the rectum with extrusion of the small intestine through the anus, (2) fractured pelvis.

On opening the abdomen, a loop of ileum 60 cm. long was found torn from its mesentery, which passed through a rent in the mesosigmoid from right to left and downwards through a tear in the posterior parietal peritoneum, approximately over the sacroiliac synchondrosis. Further examination revealed the same loop passing downward behind the rectum, which was stripped from the hollow of the sacrum and had a laceration 5 cm. in length, 2 cm. above the anal margin through which this same loop passed and finally protruded from the anus (Fig. 1). The torn mesentery was bleeding. The mesosigmoid was torn in an avascular area. There was considerable bleeding from the tear in the posterior parietal peritoneum. Spicules of bone were felt in this region. The iliac vessels and part of the lumbosacral cord were exposed.

The free blood was sponged out of the peritoneal cavity. The mesenteric hemorrhage was controlled by suture. There was a generalized bleeding from the rent in the posterior parietal peritoneum over the sacroiliac synchondrosis, but no active spurting vessels. This hemorrhage was controlled by tight packing. The gut was clamped and cut at the point of separation from the mesentery. Ends of the torn segment were closed with a purse-string suture, and the segment was removed by pulling the protruding gut from the anus. A lateral anastomosis was performed and the

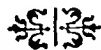
rent in the mesosigmoid sutured. The rent in the rectum was sutured. The posterior parietal peritoneum was sutured over the packing in the hollow of the sacrum. The end of the packing was pulled to the lower end of the abdominal wound. Two cigarette drains, one pelvic and the other in situ, were employed. Routine closure. A rubber tube was inserted into rectum, reaching above the perforation.

Patient expired shortly after operation while an infusion of saline was being administered.

A post-mortem roentgen-ray examination showed a fracture through the left acetabulum and a crushing fracture of the fifth lumbar vertebra (Fig. 2). Autopsy verified these findings and disclosed in addition a partial dislocation of the sacroiliac synchondrosis. There was no intraperitoneal hemorrhage or other visceral injury except the repaired intestine described at operation. The lateral anastomosis was patent and no leakage at the suture line was present.

#### COMMENT

The probable mechanism of the injury was as follows: the tearing of the gut from its mesentery, the rent in the mesosigmoid and tear in the rectum occurred simultaneously. Later the detached bowel sought the path of least resistance. The anal sphincter being dilated, the result of shock, allowed the loop of bowel to escape externally.



#### [SURGICAL SUGGESTIONS]

A LOOP of bowel strangulated or long incarcerated in a hernia may retain its viability after the operation, yet maintain a persistent paresis causing an ileus at that level.

# TRANSACTIONS OF THE SECTION OF SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of January 7, 1927*

THE CHAIRMAN, DR. FREDERIC W. BANCROFT, PRESIDING

## METABOLISM IN BURNS\*

JOHN J. MOORHEAD, M.D.

*(Condensed)*

THE local and systemic manifestations of burns partake of the metabolic reactions common to infections in general, particularly to wound infections. It is a common observation that burns of like origin, of like local effect, are widely diverse in their systemic effects upon persons alike as to sex, age, race, occupation and station in life. For example, shock from a burn may appear early, or it may be delayed for from three to seven days, or to as late as the fourteenth day. Children, in particular, are prone to manifest these early, intermediate or late shock phenomena, and the causation has usually been ascribed to psychic trauma, to infection or to the absorption of burnt tissue. These manifestations are by no means limited to extensive burns, deep or otherwise. Burns by electricity are supposed to be less painful, to heal more rapidly, and to offer a most favorable prognosis. My observations do not confirm this. I have rarely seen an electrical burn in the absolute sense, most of them being in reality heat or flame burns.

In some crushing wounds, there is a retarded or late shock definitely assignable to absorption of devitalized tissue elements. This is, in effect, a protein reaction, anaphylactic shock.

We have tried in our series of cases to show the exact nature of this reaction in terms of blood chemistry in the hope that

we could thereby suitably alter the circulating blood, thus preventing or minimizing this form of shock. We have also attempted to determine the bases for speedy repair, aiming to provide the organism with means to combat infection in the belief that wound sterilization is best attained through the medium of the circulating blood rather than through the agency of antiseptics, however highly these are vaunted. Antiseptics act only by virtue of mechanical cleansing, by virtue of dissolving slough, by staining and thus fixing the organisms, and by a process of local germ killing that must be limited if the tissues themselves are not also to be killed.

The laboratory will eventually solve this infected wound problem for us by showing us how to alter the circulating fluids in such a manner that organisms of a particular type cannot grow in a given habitat. In horticulture this soil reaction is a matter of relatively easy determination, so that forestry, for example, is governed by the chemistry of the soil as well as by climate, altitude and proximity of rocks or flowing streams. The organisms that defoliate a forest have in many instances been checked, not by spraying the trees, but by altering the nitrogenous content of the soil. It is an old trick in farming to rotate crops.

My belief is that something of this same sort is taking place in our present conception of infected wounds, burns and others. Recently we deliberately planted pyocyaneus in a bed of streptococcus and the green weed grew abundantly and smothered the coccus; and while the patient recovered with a stiff elbow, the

\*With report of laboratory studies by John A. Kilian, M.D. (By invitation.)

arm was saved. We did the same thing in an osteomyelitis with a long-standing crop of staphylococci. Here again the green thrived and changed the entire external appearance of the leg.

We have all seen in sepsis the occasional almost miraculous effect of injections of milk, or typhoid or diphtheria serum, and we regard their effects as a form of protein reaction.

Our aim should be so to alter the circulating fluids that these will be reparative as well as antiseptic. It is therefore interesting to know what blood chemistry shows in burns, and with that in view my collaborator, Dr. Kilian, will report the results of his study of a small number of cases.

A similar line of investigation has been carried out in a group of fractures to determine whether or not the calcium and phosphorous content of the blood offered prognostic criteria. Thus far we have not been able to show any substantial changes, and we do not believe that calcium and phosphorous alterations are anything more than chance findings or normal variants in bone healing. We are convinced that non-union in fractures is not dependent upon demonstrable deficiency either in calcium or phosphorous. The obvious corollary is that these elements play no essential part in wound healing, and if this be true, then the  $\text{CO}_2$  content may be the greater factor. Dr. Thomas Buchanan, in charge of the anesthesia department at the Post-Graduate Hospital, has shown that he can alter the clotting time of the blood during an operation by changing the amount of  $\text{CO}_2$  in the anesthetic. He believes that the amount of oozing is also controllable through the inhalant, and in this respect at least we all can record the clinical observation that certain anesthetics apparently produce more oozing than others.

Up to this time my own method of managing burns has been to regard them as infected wounds passing through three phases of evolution:

The first phase is that of local inflammation, virtually a dermatitis characterized by redness, pain and swelling. Here the plan is to apply a wet dressing of sodium bicarbonate (5 to 10 per cent), keeping the dressings moist by a fenestrated tube arranged to sprinkle the entire area. We do not disturb this for the two to four day period of this phase, pain being controlled by morphine, the shock being suitably combatted by rectal drip or otherwise.

The second phase is that of exudation, and this we seek to control by exposure of the entire surface to the open air, to sunlight or to the rays from 50 watt electric bulbs. We protect the discharging surface by a cradle or wire mesh. At night, or if crusts form, we cover the area with a gauze dressing soaked in equal parts of sterile olive oil and camphorated oil. We know that this exposure method best provides unimpeded drainage, effectively prevents absorption and thus lessens fever and other systemic manifestations.

The third phase, that of cicatrization, also responds to this same exposure method, and in addition we occasionally add a wound fertilizer in the form of scarlet red ointment, 1 dram, to sterile olive oil, 1 ounce.

At all times we seek zealously to prevent contracture by keeping in advance of it, and thus posture and planned gymnastics are as much a part of therapy as the dressings or external applications. This form of prophylactic physical therapy is just as applicable in burns as are early massage and mobilization in a joint fracture. For example, in wounds of the face and scalp we insist that the patient grimace frequently, blow out the cheeks and chew gum in an attempt to prevent deformation so common in this area.

We reserve débridement for that group, as in other wounds, in which there is localized destruction. If used indiscriminately it may be a source of real danger, or it becomes more mutilative than curative. The greatest sphere of usefulness for

débridement is that form of burn associated with localized wet or dry gangrene manifested by demarcated sloughing, or parchment-like attempted repair. There is also a small group of burns in which early débridement and immediate plastic repair may be attempted to prevent inevitable contractures leading to later plastics.

I have had no personal experience with chemical débridement, as by tannic acid, carbolic acid or zinc. Of these, the tannic acid procedure seems to have the greatest merit.

I know of no method to prevent keloidal formation, but my observation is that it is less prevalent since the adoption of the exposure method. It is my practice not to interfere surgically early in keloids because many of them spontaneously recede and others are softened by roentgen therapy.

For burns of minor degree there is no real objection to occlusive dressings of the paraffin type; but obviously a retentive covering has no more place in a discharging burn than it has in a discharging wound from any other source.

**CASE I. Extensive Burn with Tetanus.** Two weeks before admission to hospital on October 19, 1923, this boy, aged eight years, was playing at a fire of leaves in a vacant lot, when his trousers caught fire. To extinguish the flames he was wrapped in a horse blanket which probably conveyed the tetanus infection. He sustained second and third degree burns of both legs, from the knees to the tops of his shoes, which were treated with wet dressings of bicarbonate of soda, followed by boric ointment. On October 18, twelve days after the injury, the wounds were clean but the boy's jaw was taut and he was unable to open his mouth. There was also a leg muscle spasm for three days before admission. The jaw symptoms continued.

Immediately upon admission tetanus antitoxin was administered. Soda bicarbonate dressings were applied to both legs. Later olive oil dressings were applied. Also, in the operating room paraffin dressings were applied under general anesthesia. No grafting was done, yet the result is excellent. Between October 19

and November 4, 91,000 units of tetanus antitoxin were administered: 53,000 intravenously, 13,000 intraspinaly, 25,000 intramuscularly, an average daily dose of 5353 units.

**CASE II. Burns by Electricity.** Male, aged forty-seven years, an electric switch-board operator. On September 26, 1919, he was walking in a space 3 feet wide, just enough to allow for passage, containing three electric bus feeders, 11,000 volts each. Next to the bus feeders there were protecting iron bars running from the ceiling to the floor. The patient was carrying a rag in his hand and as he was passing these electric buses his foot slipped against the iron upright and the arm that carried the rag went up in the air and came in contact with the electric bus feeders. The patient suddenly became unconscious. He was immediately removed to the hospital where he remained unconscious for seven hours.

He showed third degree burns of the occipital scalp, the right arm and hand and the right heel. The burn of the head showed a denuded area 4 inches in diameter. The skull was exposed. The right hand showed a burn down to the metacarpophalangeal joints. The burn of the right heel exposed the os calcis.

After the patient had been in the hospital twelve weeks an operation was performed to remove the necrosed outer table of the occipital bone. A second operation was performed to cover the denuded area by a skin flap from the surrounding tissue. At a third operation a skin graft from the right thigh was applied. Ultimately this operation was successful.

After discharge from the hospital the patient was treated in our Out-Patient Department and he made a most remarkable and uneventful recovery. He has been working since January 1, 1920. There are no symptoms referable to the burns. He is not in any way incapacitated, he is not disfigured except the scar on his head which is not visible except when closely observed.

**CASE III. Burns by Electricity.** Male, aged forty-six years. At the time of his accident, July 19, 1920, the patient was cleaning the walls near some oil switches in a sub-station power house. These power switches were carrying 11,000 volts of electricity. He dropped some water on the oil switches, thus making a short circuit, and a sudden flash of flame enveloped him. He was immediately removed to the

Post-Graduate Hospital where it was found that he had a severe burn of both eyes and face and third degree burns of the right arm and body, chest and right leg. He was in the hospital from July 10 to October 13, 1920. After his discharge from the hospital he was treated in our Out-Patient Department. He made a very unusual recovery. There is no remaining eye disturbance or facial disfigurement. The scars have nearly all cleared up.

### *Discussion*

DR. SETH M. MILLIKEN: I much enjoyed Dr. Moorhead's paper because I thoroughly agree with him, except that I consider a burn by electricity the same as any heat burn on the surface of the body and do not place it under a separate classification.

DR. WILLIAM T. DORAN: I hope the work of Dr. Moorhead and of Dr. Kilian will soon result in a decrease in the ultimate effect in some of these cases. At the present time in most of the hospitals we are doing the best we can, but all not having the best equipment, the results from the methods of treatment used, such as tannic acid, are not always what we would like. I hope there will be brought out something of permanent value and within the use of all.

DR. CLAY RAY MURRAY: I was interested in what Dr. Moorhead said about the blood calcium and phosphorus changes and their relation to metabolism in burns. In checking up Tisdale's work with Eddy of Columbia we held the idea that this metabolic change was a general manifestation of the healing in process, not specific for bone healing, and some 80 cases where the laboratory reported this change there were several cases of extensive burns in which calcium and phosphorus in the blood were increased. This we regarded as a manifestation of healing processes resulting after the burn itself, and therefore having no specific relation to the burn.

DR. RALPH COLP: I think we should be grateful to Dr. Kilian for his excellent work, but if we reflect on these metabolic changes we must be struck with their similarity to those we see in cases of acute intestinal obstruction, gall-bladder disease complicated by cholemia, and kidney disease terminating in uremia. Diminution in the blood chlorides is present in intestinal obstruction and with this usually occurs an increase in the non-protein nitrogen, urea in the uric acid and often the creatinin.

Cases of severe burns have been associated with the duodenal lesions. Cases of intestinal obstruction are often associated with duodenal lesions, and occasionally in both these conditions a fatal anuria occurs. Therefore, I do not believe that these metabolic changes observed in Dr. Moorhead's cases are applicable only to cases of burns, but are rather a page in the general metabolism occurring in the conditions described above.

DR. FREDERIC W. BANCROFT: The whole problem of burns is very interesting. The most pathetic cases to me are those that live on to the third week and then die. They may be given saline infusions and transfusions, but despite all treatment they die, often fairly suddenly. There is something we must learn about the cause of this if we are to save this type of case, and I believe Dr. Moorhead and Dr. Kilian are working in the right direction. One does not feel so bad about patients who die of the immediate shock but we should study this late type carefully, for we are as yet ignorant of the cause of death and we may learn some method of improving the condition.

DR. MOORHEAD (closing): Replying to Dr. Colp regarding gastrointestinal symptoms, I have a distinct impression that among the cases of burns I am seeing now there have rarely been such manifestations. Gastroduodenitis was formerly considered to coexist often with burns.

DR. KILIAN (closing): Dr. Murray mentioned changes in calcium of the blood in wound healing. We followed some of those cases and found that in some of them in an early period immediately after the burn there was a drop in calcium and a rise in phosphorus but later the calcium rose to a very high level. That was probably associated with tissue healing. I do not believe we can explain the changes in the chloride in the blood and urine on the basis of intestinal obstruction or changes in the gastrointestinal tract. Others have done valuable work on the influence of the gastrointestinal tract and show that intestinal obstruction associated with vomiting leads to lowered blood chloride with diminished output in the urine. But we cannot explain the changes in burns by a loss of chloride in vomiting or retention in gastrointestinal tract. Some other explanation will have to be offered for this drop in the chloride. It is similar to the changes seen in chloride metabolism in pneumonia; that cannot be explained by associated changes in gastrointestinal dysfunction. There have been



numerous attempts made to explain these changes but all of them have been unsuccessful. I do not believe we will ever be able to explain the origin of the toxemia referred to by Dr. Bancroft without extensive animal experimentation and that presents difficulties with the Society for the Prevention of Cruelty to Animals.

## FRACTURES OF THE TRANSVERSE PROCESSES OF THE LUMBAR VERTEBRAE

ROBERT H. KENNEDY, M.D.

### (Abstract)

There is apparently considerable difference of opinion in regard to the frequency, importance and treatment of fractures of the transverse processes of the lumbar vertebrae. From the scarcity of references to this injury one would think the lesion either rare or of little moment. Some even suggest that it is non-existent, the roentgen-ray appearance being due to bony abnormality. A knowledge of the amount of disability caused is important, for one thing, in estimating insurance loss, as many of these are compensation cases. Some state that prolonged immobilization or more radical procedure is necessary, apparently feeling that they are dealing with an injury followed by considerable disability. This paper reviews the literature and our experience in 10 cases at the Surgical Clinic of the Beekman Street Hospital.

Among injuries to the back, fractures of the transverse processes of the lumbar vertebrae are not rare, although it is to be emphasized that bony anomalies in this region are frequent and may tend to confuse the diagnosis. The most common cause of fracture of the transverse processes is direct violence. The symptoms and physical signs are those of a severe sprain or contusion of the back. Such fractures are usually multiple. When uncomplicated by body fracture, all the fractures are usually on the same side.

The disability caused by the injury is due solely to the associated contusion or sprain

of the back, and the presence of the fracture is negligible as far as prolongation of disability is concerned. Owing to the frequency of traumatic neurosis, it is preferable that knowledge of an existing fracture be kept from the patient. Bony union of the fractured transverse processes is definite in some of these cases. More careful examination of backs should be made before employing men over forty at hard labor.

The treatment required is rest in bed, heat and massage. Prolonged immobilization is no more necessary than in any contusion or sprain of the back. In this series patients were able to walk after an average period of sixteen days. Disability over six months is out of the ordinary. The majority of patients should be at work within two months with practically no complaints referable to the injury.

CASE I. J. C., male, aged forty-three years, laborer, was admitted to Beekman Street Hospital March 12, 1926, having fallen in an elevator shaft, striking head and back. He had a lacerated wound of the right frontal region and rigidity and tenderness in the lumbar region. Roentgenograms showed fracture of the right transverse process of the third lumbar vertebra. He was kept in bed three weeks, receiving physical therapy. His back was not strapped. He returned to his usual work in eight weeks. After eight months examination showed the function of his spine normal in all movements. He had no complaints referable to his back. Roentgenograms at this time showed apparently bony union. This case is reported to illustrate early return to work and bony union of such a fracture.

CASE II (*Demonstrated*). B. R., male, aged twenty-four years, laborer, was admitted to Beekman Street Hospital May 18, 1926, a fire reel having run over his back. He claimed that he could not stand and had severe pain on any movement of the back for several days. There was definite hematoma, with rigidity of the muscles in the lumbar region. Roentgenograms showed fracture of the right transverse processes of the first, second and fourth lumbar. He was strapped with adhesive plaster for the first eight days. He sat up in

bed after one week. He commenced to walk in twelve days, but his back was painful on bending. After six weeks, movements of the back in all directions seemed to be complete without discomfort and he had no complaints. Settlement of his compensation was made two months after injury and he returned to light work immediately. I saw him again in October, 1926, five months after his injury. He seemed perfectly well and was advised to do any work he saw fit. This patient is presented to illustrate early return to work and the lack of return of symptoms after a number of months.

**CASE III (Demonstrated).** E. K., female, aged eighteen years, stenographer, was admitted to Beekman Street Hospital November 9, 1926, having been struck and thrown down by a motor truck. The mechanism of the injury could not be learned. She complained of severe pain in the lower back. There were tenderness and rigidity of the lumbar muscles. Roentgenograms showed fracture of the right transverse processes of the first, second, third and fourth lumbar with considerable lateral displacement. She remained in bed three and one-half weeks, and received physical therapy, but no strapping. Pain on movement continued for about ten days. She was discharged from hospital December 9, 1926, one month after injury. At this time her examination was negative, except for slight pain on full lateral flexion toward the left side. This patient is presented to show the early result in such an injury.

### Discussion

**DR. CLAY RAY MURRAY:** I was very much interested in what Dr. Kennedy had to say, and think he has the right idea of the treatment of these cases. I have had opportunity to see a large number of cases of fracture of the transverse processes of the lumbar vertebrae. On what I believed to be the advice of Goldthwait of Boston, I have operated on a number of them, excising the separated fragment. Being able thus to demonstrate the pathology I think that anyone discussing the probable cause of the disability would agree with Dr. Kennedy that the bone lesion is secondary. The nearest description one can use for the condition of the soft parts is "beef-tea"; there is no muscle tissue, it is merely a mass of bloody pulp. In the presence of so severe a muscle lesion, with the scar tissue result, the

bone lesion is dwarfed. In addition, in one case, the effect of telling the patient what he had bore out what Dr. Kennedy said. The patient had been operated on and had recovered sufficiently to be able to stand up and walk eight days afterward. At the end of two weeks he could bend over to touch the ground without pain. He was eventually sent back to work and put under the care of one of the compensation doctors who told him he must be very careful as he had a broken back. From then on he was unable to work, has been careful not to endanger his back ever since, and at the end of three months, returning to the follow-up clinic, he was carrying two canes, and had quite a restriction of back movements, but no pain. He had not exercised his back since leaving the hospital. He was "being careful of his broken back."

**DR. JAMES N. WORCESTER:** I think Dr. Kennedy's paper is of great value. Up to three years ago the important thing in fracture of the transverse processes was to keep the patient in prolonged immobilization, with plaster. All these patients knew they had fractured backs and the results were not good. I agree with Dr. Kennedy that it is better not to let them know for since we have followed that system the results obtained have been revolutionary. The psychology of injury to the back is one of the oldest and most difficult problems we have to solve in industrial surgery.

**DR. JOHN J. MOORHEAD:** In these cases the symptoms are sometimes out of all proportion to the objective signs and roentgen findings; in a number of cases the physical signs are slight and the roentgen-ray signs many and vice versa. Dr. Kennedy mentions these facts in some cases. I think a great deal of care should be taken in making a diagnosis of fracture of the transverse processes of the lumbar vertebrae, and one should not pass judgment on a roentgenogram unless verified by someone very expert in reading roentgen-ray pictures. The physical signs should also check up very accurately with the roentgen-ray zones of injury. I am always on my guard when an individual is able to localize a small spot of pain. I pay particular attention to localized tenderness on motion. I consider that this should be observed with extreme care in this and other back injuries inasmuch as painful back arises from many sources.

**DR. SETH M. MILLIKEN:** I should like to mention a case in which the patient received

a transverse process fracture by direct violence. He was struck on the back by a rock in an excavation and had a very large hematoma and a very stiff back. He was in bed for a few days and was then encouraged to get up and about. We did not think there was anything the matter with his spine because he had suffered direct violence and we had supposed this fracture was caused by muscular contraction. The roentgen ray, however, showed the defect. The patient had not been informed because we did not believe he had a fracture, and afterward we did not tell him because he was doing so well. At the end of the fourth week he had recovered the entire motion of the back and although the back was still stiff and there was a fossa in the right lumbar region, normal motion could be carried out, although slowly. He made rapid progress under physical therapy so that in seven weeks after the injury he went home. As to the cause of the fracture it is hard to know how this process can be fractured by direct violence and I would like to have Dr. Kennedy explain that to me. Dr. Kennedy remarked that local injury to the muscle caused the symptoms and I agree. The insurance companies' attitude towards fracture of the transverse processes needs correction. "Broken back" is a term they understand. As to the method of treatment, I do not understand the rationale of rest in bed, plaster cast or strapping. Use of the muscle restores circulation and our cases have had no treatment except vocal encouragement. Roentgenograms are very important and should be read by one of experience. In some of the cases I have seen the fracture was obvious; in some it was difficult to diagnose. The first lumbar transverse process is hard to break because it is protected by the first rib. Some of Dr. Kennedy's cases of first lumbar process fracture do not appear to me to be such.

DR. EDGAR D. OPPENHEIMER: I was surprised to find so many of these cases existed; I have had seven in the past year in a small hospital. The injury must be more common than supposed. I do not think the fracture itself is a serious lesion but there is always considerable attendant back injury. My cases had so much pain that they were unable to do their work properly. To try to encourage them to do work they are not able to do is not our duty. As regards the treatment, I take a different view from that of most of the speakers this evening. I believe that when we get these patients early we should immobilize them. We

should give them what support we can with a jacket or brace to get them gradually back to the point where they are able to do light work at first. If we do that we will avoid seeing them get worse after six months, especially mentally.

DR. MATHER CLEVELAND: The persistence of the pain, in one case presented by Dr. Kennedy, does not seem to me to be necessarily due to fracture of the transverse processes. There are fractures that involve the lamina that cannot be seen by roentgenogram which cause a great deal of pain; and they are sometimes found on exploratory operation. Perhaps this case with fracture of the transverse processes with pain over a long period of time may also have had a lamina fracture. I think Dr. Kennedy's point that industrial organizations would do well to get roentgenograms of the backs of employees is very well taken. There are many people who have potentially weak backs with abnormalities at the lumbosacral junction in particular who, owing to the difficulties of their work and perhaps strain, will develop definite backache, and if one could establish the fact of a potentially weak back it would be of great value in determining the extent or validity of a claim upon the employer.

DR. LEON T. LEWALD: At the last meeting of the American Roentgen Ray Society in a paper by Dr. W. B. Bowman of Los Angeles, it was said that a large trucking corporation has established the rule of having a roentgenogram of the spine made of employees to determine the presence of anomalies of development or deformities from previous injury or disease. I feel that all employers will do that eventually. Dr. Moorhead made an interesting statement relating to tenderness in one spot over a supposed fracture. It is my custom to put a lead marker over such a suspected area and see if it coincides with the fracture line in the roentgenogram.

DR. FREDERIC W. BANCROFT: I would like to know exactly what occurs in this injury. The transverse processes are so deeply situated that it is difficult to attribute the fracture to direct injury. An indirect injury of such an extent that the muscle will tear out of place three or four lateral processes must produce very marked trauma of the muscles themselves. It will be interesting to know what the results in these cases are one or two years after injury.

DR. KENNEDY (closing): As to the treat-

ment, it seems to me that prolonged immobilization of a bruised back is inadvisable on account of the effect on the muscles. The end result would be worse than if one tried to restore function early. In a sprained ankle one must consider the repair of torn ligaments, while in these back cases the main injury is not to ligament, so that this analogy does not hold.

As to the likelihood of recurrence of symptoms later, referred to by several of the speakers, the longest follow-up has been ten months after injury and there have been two others after eight months. These patients are back at their regular employment, doing routine work, and none has any different complaint after eight and ten months than after three and six months. Two of the 10 cases were complicated by fracture-dislocation. Two could not be traced. Six were working in six months and one of them still complained of pain. He had three transverse processes fractured, but all seemed to have united. He has complained of pain, however, ever since he discovered he had a fracture.

As far as the character of the producing violence is concerned, there must be muscular strain in all of these cases, unless the injury is such that all tissues between the skin and the transverse processes are injured. The meaning of direct violence that I intended to convey, was force applied at the level of the injury. In reference to confinement in bed, I feel that these patients deserve rest in bed until there is no pain, or very little, on motion, because we are dealing with damaged muscle. In reply to Dr. Oppenheimer, I do not feel that we were forcing these patients to return to work. They were able to do so and thus far have been none the worse for it.

## FECAL FISTULA: AN AID TO CLOSURE

DAVID H. ORGEL, M.D.

In his article on "Pneumatic Rupture of the Bowel,"<sup>1</sup> George L. Hays refers to the use of a Barnes bag to stop drainage from the cecum after cecostomy.

This method was resorted to by me in the treatment of a fecal fistula where the drainage from the ileum was copious, absorption of the upper bowel contents was

<sup>1</sup>Hays, G. L. Pneumatic rupture of the bowel. *Surg., Gynec. & Obst.*, 1926, xliii, 491.

lacking and the general condition of the patient was deteriorating from lack of nourishment, although he was taking plenty. The discharge of the contents of the small intestines produced an unhealthy condition of the skin and tissues for some distance adjacent to the wound and prevented granulation and healing in spite of all protective measures.

I had a Barnes bag made with a constricted central portion, giving the bag a sort of hour-glass or fiddle shape. On introducing this modified Barnes bag into the small intestine up to its narrow part, distending it gently with air and clamping the tube, we were able to diminish the discharge and, with constant care, the parts began to look normal and the patient regained his health and strength so that a secondary operation for the closure of the fistula could be and was successfully undertaken at the City Hospital.

This aid should be used in cases of large fistulae only.

## PRESENTATION OF CASES ABSCESS OF THE LIVER

JOSEPH E. J. KING, M.D.

J. L., Italian laborer, aged fifty-five years.

*History:* Detailed history could not be obtained on account of patient speaking but little English.

He had pain in the right side of abdomen, upper portion, first noticed two weeks before. During the first four days the pain was very severe. He vomited frequently (no blood). Vomiting had no relation to meals or taking of food. He was in bed during the first five or six days of his illness on account of pain and vomiting. During the three or four days before examination he had complained of pain in the upper right quadrant, but this pain had not been severe. He was nauseated from time to time but vomiting was not marked. He had lost considerable weight during the last two weeks, although he had been gradually losing weight for a year or more. His chief complaints, when he presented himself for examination on October 5, 1926, were pain in the upper right abdomen and nausea with occasional vomiting.

*Physical Examination:* General appearance: Rather emaciated; did not appear to be acutely

ill; walked about with his hand over the upper right abdomen, somewhat stooped forward. He was not jaundiced. General physical examination was negative with exception of abdomen and pulse rate. Pulse: 44 to about 48, full, strong and regular. Blood pressure not taken.

**Abdomen:** General bulging or fullness of the right upper quadrant which did not appear to shift with respiration. The skin was not reddened or indurated. Tenderness over the region of the gall bladder and slight rigidity of the muscles. No circumscribed tumor mass could be made out but a definite fullness in this region could be determined. Pressure at this site produced pain which did not radiate in any direction. Liver dullness increased downward  $1\frac{1}{2}$  inches below the costal margin. Urine was negative, no bile present. Blood chemistry was negative.

**Provisional diagnosis:** 1. Abscess of the liver; 2. Gall-bladder disease with cystic duct obstruction; 3. Echinococcic cyst of liver.

**Roentgen Examination:** The patient was sent to Lexington Hospital. Roentgenograms showed a ring-like shadow in the area of the liver with its inner border reaching almost to the right border of the vertebral column. This shadow measured about  $2\frac{1}{2}$  inches in diameter. Its upper margin was 2 inches below the shadow cast by the dome of the diaphragm. The level of the diaphragm was not exaggerated on the right.

With barium meal, the duodenal cap was cupped, resembling an acorn cup, the duodenum measuring  $1\frac{3}{4}$  inches in diameter, and  $\frac{3}{4}$  inch in depth. These plates showed definite evidence of a mass from without pressing on the duodenum.

**Diagnosis (from radiographic films):** Enlarged gall bladder or a mass in the liver: abscess, cyst or tumor.

**Operation:** October 7, 1926.

There was a bulging, fluctuating mass on the under surface of the liver which corresponded in position to the depression in the duodenal cap shown on the roentgen-ray plates. This was considered to be an abscess rather than an echinococcic cyst on account of its degree of fluctuation. The gall bladder was normal. There were but few adhesions along the under surface of the liver, but the upper surface was rather firmly adherent to the diaphragm. An aspirating needle inserted at the point of greatest fluctuation on the inferior surface of the liver revealed a thick yellowish-

brown pus. It was not reddish brown. A specimen was saved for culture and smear. The abscess was opened and was found to be distinctly encapsulated, the wall being about  $\frac{1}{8}$  inch thick. The cavity was explored, found to be unilocular, i.e., a single abscess, and about 3 inches in diameter.

**Procedure:** A straight vertical incision as for a cholecystectomy was made. In order to bring the under surface of the liver into view so that the abscess could be drained through the thinnest portion of its wall, the lower free margin of the liver, where the gall bladder was attached, was sutured to the upper angle of the abdominal incision, so as to leave the under surface of the liver in a position vertical to the anterior abdominal wall. With the area well packed off, an incision was made in the thinnest portion of the abscess wall, the liver substance at this site being about  $\frac{1}{2}$  inch thick. By bimanual palpation, it was estimated that the thickness of the liver substance above the abscess was about  $1\frac{1}{2}$  to 2 inches. Two  $\frac{1}{2}$ -inch rubber drainage tubes were inserted into the abscess cavity and were sutured to the liver substance to prevent dislocation; the remainder of the cavity was packed loosely with iodoform gauze, a cigarette drain was placed outside of the cavity, all were enveloped in a rubber dam, and were brought out near the upper angle of the incision.

Smear was negative. Culture was negative after forty-eight hours.

**Postoperative Course:** Uneventful recovery, except for a cystitis which developed following several catheterizations, and which promptly cleared up. The highest temperature was on the first day following operation,  $102^{\circ}\text{F}$ ., dropping to normal and remaining so on the fourth day, except for the elevation of temperature associated with the cystitis.

Drains were removed on the seventh day, at which time two small Dakin-size rubber tubes were inserted into the abscess cavity. Daily instillation of Dakin's solution was done at the time of changing of dressing. The patient was discharged from the hospital on November 20, 1926, after being up and about the room for about three days. He has remained well and has gained about 20 pounds.

The pulse rate remained about 40 to 42 until the eighth day postoperative, 54 on the tenth, 60 from the eleventh to the fourteenth, and 70 from the seventeenth day postoperative.

(No discussion)

## ECHINOCOCCUS CYST OF THE LIVER

HENRY W. CAVE, M.D

Patient, an Italian aged twenty-four years, was admitted to the Roosevelt Hospital, November 20, 1925, with a complaint of pain in the stomach at intervals for six months. He had been in the United States for five years. Previous to that time he had always been in Italy, otherwise his personal history was unimportant. Family history was negative. Present illness began about six months ago after a meal, with a sudden burning pain in the region of the stomach, followed by nausea and vomiting. Entirely symptom-free during the intervals. Each attack has occurred after the evening meal. The attack which brought him to the hospital began ten days prior to admission and lasted continuously for eight days, similar in every respect to the previous attacks except that the pain was much more severe and lasted for a much longer time. He states that his skin has been yellow for seven days, but was never jaundiced before.

*Physical Examination:* He was a well-nourished young man. Examined very thoroughly, nothing of importance could be found except the jaundice. Blood pressure was 110/70; red blood cells 4,600,000; hemoglobin 85 per cent; white blood cells 12,800; polymorphonuclear cells 78 per cent; blood chemistry normal. Other than bile and an occasional trace of albumin nothing was found in the urine. The roentgenological examination revealed a fairly large area of calcifications in the liver. These calcifications simulated the form of a multilocular cavity. Diagnosis from the roentgenograms: calcification of a multilocular cyst of the liver and deformity of the duodenal cap.

*Operation:* November 25, 1925. High right rectus incision. Numerous peripyloric and periduodenal adhesions found running to the under surface of the gall bladder and liver, thus accounting for the deformity of the duodenal cap. Gall bladder was grey, thickened and did not empty readily. A thick grating substance was felt within the gall bladder suggestive of sand or fine stones. Gall bladder and adhesions about the duodenum were not disturbed. Well up in the right lobe of the liver onto the dome was found a calcified area approximately 10 cm. by 4 cm. In order to obtain a better exposure of this partially calcified cyst of the liver, the

upper right rectus muscle had to be incised straight across and a reversed Trendelenburg position had to be resorted to. The liver was dislodged by traction on the falciform ligament and packing of gauze well up over the dome and to the right lobe, thus bringing the liver well down to the left into the wound. Clear fluid was then aspirated from the cyst cavity and following this a very careful enucleation of the entire cyst was carried out with extremely little bleeding. The cyst wall was very firm and thickened. A gauze pack was placed in the cavity and brought out through the anterior abdominal wall at the upper angle of the wound. The wound was closed in the usual way. Convalescence was surprisingly easy except for the continuous and profuse bile drainage for sixty days. On January 21 plain roentgen-ray plates covering the abdomen showed no evidence of the cyst previously shown. The patient was discharged from the hospital cured sixty-three days after the operation.

*Pathological Report:* Echinococcus cyst of the liver.

*Postoperative Care:* Patient has been seen during the past year about every three months and in every way his cure has been most satisfactory. The interesting features of this case were the firmness and thickness of the cyst wall, the ease with which a complete enucleation was carried out and the profuse and prolonged bile drainage. I understand that in Prof. Alexandra's Clinic in Rome at the present time, where so many of these cysts are operated on, no drainage is being used. The wounds are all closed tight, with good recovery.

## Discussion

DR. WILLIAM T. DORAN: I consider that Dr. Cave was very fortunate in being able to save the life of this patient for so long a time. I had one patient who was apparently well after operation for five years and then suffered a recurrence. I hope this will not occur with Dr. Cave's case.

DR. ISRAEL L. FEINBERG: As to the question of cure, I think this may be doubtful because other cysts may appear with renewed activity. I was recently shown a case in which this condition had existed and there was a question as to the diagnosis. I believed there was an echinococcus cyst of the lung and it subsequently turned out to be so. In my opinion, before this young man is declared cured a roentgen-ray examination of the lungs should



be made to see whether there is any involvement there that may ultimately give symptoms.

DR. JOHN A. MCCREERY: I think that Dr. Cave was fortunate to find a localized cyst that could be completely extirpated. At Bellevue Hospital, where perhaps half a dozen cases are seen in a year, it is very rarely that this can be done, the tumors usually being multilocular and too extensive for complete removal.

DR. JOSEPH E. J. KING: I had a patient in 1924 who had never had any symptoms until he sustained a fall in an elevator, was badly shaken and vomited. Symptoms became acute. At operation an echinococcus cyst was found in the lower lobe of the liver between the gall bladder and the round ligament. It was 3 to 4 inches in diameter and projected slightly from the margin of the liver. I was able to enucleate it completely, but it was so large I could not bring the parts together so I approximated the lower and upper surfaces as closely as possible and inserted a small drain. The wound healed and the patient went home in three weeks and has had no further trouble. That is the first case I ever saw in which the cyst could be entirely enucleated. I think Dr. Cave is to be congratulated on also having been able to accomplish this in his case.

DR. CAVE (closing). Of course my patient may get other cysts in the liver, but the sharp line of demarcation was striking and the entire cyst could be removed without any difficulty. At first I decided against drainage, but it seemed such a large area that I put in gauze.

### OBSTRUCTED JAUNDICE DUE TO CALCIFIED LYMPH NODES AROUND THE COMMON BILE DUCT

HENRY W. CAVE, M.D.

This patient, a man aged fifty-four years, was admitted to the Roosevelt Hospital on August 9, 1926, complaining of weakness and jaundice. Family and personal history were irrelevant. Present illness began about five weeks before with slight stiffness of all of his joints, general weakness and indefinite distress after the intake of food. His illness, however, took no definite form until three weeks before admission when he became jaundiced, and had clay-colored stools and dark bile-stained urine. He had lost 20 pounds in the preceding five weeks. There had been no pain and no vomiting.

Physical examination showed a fairly well-developed and under-nourished man who

appeared to be ill. His skin and sclerae showed definite jaundice with a slight greenish tint. The abdomen appeared to be moderately full; no masses palpable; the edge of the liver was palpable  $1\frac{1}{2}$  inches below the costal margin. Slight tenderness was elicited to the right of the midline in the epigastrium.

A provisional diagnosis was carcinoma of the pancreas. Clotting time was three minutes; blood pressure 118/78; blood count normal.

*Operation*, August 10. Upper right rectus incision. The liver was found to be somewhat enlarged; approximately three fingers' breadth below the costal margin. It was normal in appearance and in consistency. The gall bladder was not distended appreciably, thin walled, bluish and did not empty readily on pressure. Numerous large hard masses about the size of hazel nuts were felt, which were first taken to be stones within the lumen of the common bile duct. These numerous calcified nodes running along the duct were dissected out and found to have the appearance of small bunches of grapes, all calcified. The entire lymph node seemed to be displaced by calcified small seed-like masses. To be quite sure that there were no stones within the lumen of the duct it was opened and a probe was passed quite easily into the hepatic ducts but with some slight difficulty toward the duodenal end of the duct. However, it was felt that the common duct, which was not distended or thickened, was entirely free from any stones. A small rubber catheter was inserted into the common bile duct through the opening already made and closure of the rent in the duct was made about the tube. A wrapped tube drain was placed down to Morrison's pouch. Head of the pancreas, stomach and duodenum were normal. Nothing was done to the gall bladder.

*Pathological Report*. Specimen consists of seven pieces of tissue ranging in size from 1 cm. by  $1\frac{1}{2}$  cm. to  $\frac{1}{2}$  cm. by 1 cm. They are composed of a small amount of fibrous and pulpy brown material, infiltrated with yellowish-white seed-like masses of stony hardness. On microscopical examination they showed the lymph follicles containing germinal centers, the glands infiltrated with well-organized strands of fibroid tissue which breaks the follicles up into patchy groups of follicle cells. Pathological diagnosis was chronic lymphadenitis with calcareous degeneration.

*Postoperative Course*. The postoperative course was entirely uneventful. The catheter



in the common duct was easily withdrawn on the sixteenth day and bile drainage persisted for about three days longer. The patient was discharged cured with wound healed on August 31, twenty-two days after operation.

Occlusion of the common bile duct from calcified lymph nodes surrounding it is uncommon. In this patient there was no cause that could be found for the chronic adenitis with calcification of lymph nodes. There was definitely no pancreatitis nor any demonstrable disease of the gall bladder and, except for the enlargement of the liver, there seemed nothing in this organ that could have contributed to the adenitis. The appendix was not disturbed.

(No discussion)

### CARCINOMA OF THE SIGMOID IN A YOUNG WOMAN

HENRY W. CAVE, M.D.

A patient, aged twenty-five years, was admitted to the Roosevelt Hospital on June 9, 1926, complaining of inability of bowels to move, and distended abdomen. Family history was negative. Nothing in her personal history was of any importance. Present illness began four months ago, when she noticed that her bowels would move only with great difficulty and a considerable amount of laxatives. Previous to this time her general health had been excellent. At about the same time that she noticed an increasing constipation she had influenza and during this illness vomited quite often and had a great deal of pain in her abdomen not localized at any particular point. In March she consulted her family physician who made a diagnosis of "inflammation of the womb" for which she was given turpentine enemas. At times since the onset of the illness she had felt feverish without chills. Appetite had been good until a week prior to admission. She has lost considerable weight. Seven days prior to admission she found that her bowels would not move, there was increasing distention of the abdomen and increased tenderness and for the last two days she had been vomiting.

**Physical Examination.** Patient was a sick-looking young woman with a distended abdomen. Pulse rate was 104; temperature 100.2°F.; white blood cells 10,000, polymorphonuclears 70 per cent; blood pressure 110/80. Preoperative diagnosis was intestinal obstruction, cause undetermined.

**Operation,** June 9, two hours after admission:

Right mid-rectus incision. The large intestine as well as numerous loops of the small intestine were found markedly dilated. There was an increased amount of peritoneal fluid. A large, hard, granulated growth was discovered in the sigmoid, which was fairly fixed, with marked edema and dilatation of the bowel above the growth. A few enlarged glands could be felt in the mesentery of the sigmoid. The liver was found to be negative for any metastatic involvement. On account of the patient's poor condition it was deemed advisable to do simply a cecostomy. At the end of the operation the patient's pulse was very rapid and her condition not good. However, after an infusion she seemed to improve. Cecostomy opening worked perfectly.

**Second operation,** June 28, 1926, nineteen days after first operation. The first stage of a Mikulicz operation was done through a lower left rectus incision. The annular growth in the sigmoid seemed to have diminished in size since previous operation. The wall of the bowel above the growth did not seem to be so thickened or edematous. The peritoneum at the outer side of the sigmoid was incised and the entire sigmoid delivered up into the wound. A large segment of the mesentery just beneath the growth, where enlarged nodes were felt, was excised and the leaves of the cut mesentery brought together with interrupted catgut sutures. The entire growth was brought well up on the anterior abdominal wall and after careful suture of both limbs of the bowel, wound was sutured. On July 15, the second stage was done with excision of the growth. A few days later a clamp was applied to the loops in order to cut down the spur. Healing then took place satisfactorily up to the point where, on August 21, a closure of the left colostomy was made. Seven days later a closure of the cecostomy was carried out.

**Pathological report** was adenocarcinoma of the sigmoid; metastatic adenocarcinoma of the mesentery lymph nodes.

**Postoperative Course.** The patient made an uneventful recovery. She has been seen from time to time since and has gained in weight. Her bowels have been moving regularly and she seems to be in good condition. The case is presented for the reason that growths of the large bowel in young adults are infrequent and also to demonstrate how valuable is a properly functioning cecostomy in the handling of growths distal in the large bowel.

(No discussion).

# TRANSACTIONS OF THE SECTION OF GENITO-URINARY SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of January 19, 1927*

THE CHAIRMAN, DR. FREDERICK T. LAU, PRESIDING

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## URINARY CALCULI: WITH SPECIAL REFERENCE TO END-RESULTS

E. O. SMITH, M.D., F.A.C.S.

CINCINNATI

THIS subject is as old as the human race, perhaps older, for the lower animals have urinary calculi. Notwithstanding it is one of the pathological conditions that have been discussed through the centuries, there is ever something interesting and fascinating about the study and treatment of urinary calculi. This may be due to the mystery that surrounds their formation, the certainty of the diagnosis in most cases and the near spectacular of their removal. The young surgeon experiences a real thrill as he locates a calculus and removes it. Perhaps no surgeon, it matters not his age or experience, becomes so indifferent to his work that he does not have a more or less triumphant feeling every time he cuts for, finds and removes a calculus. And besides one has something "concrete" to show the patient.

Urinary calculi were among the first pathological conditions to be relieved by definitely planned surgery. Hippocrates was familiar with this condition but would not operate. He fully appreciated the gravity of the operation, as well as the skill of the specialist, for in his oath he stated: "I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work."

Discussion of this subject naturally comes

under four headings: causes, diagnosis, treatments and end-results. End-results depend largely upon the first three.

### CAUSES

Hundreds, perhaps thousands, of pages have been published on the causes of urinary calculi, most of them very interesting, if true. If all of the causes that have been assigned were really active, every man, woman, and child would have at least one urinary calculus, while some of us would have two or three. Too much food, not enough food; too much water, not enough water; hard water, soft drinks and hard liquor. I operated on a man who had consumed about one quart of whiskey a day for the last twenty years, who had only a small calculus in his bladder. If hard liquor is a cause he should have been petrified.

Geological or telluric conditions have been given as causative factors. There seem to be more cases in certain localities than in others. A study of the water supply in some of these districts would lead us to think perhaps it is a factor. For instance, the water supply in the blue grass country of central Kentucky is high in lime salts and it is a well-known fact that at least formerly many persons residing in that locality had urinary calculi. It was in

Lexington, Kentucky, that Dr. Benjamin Dudley from 1815 to 1850 performed 225 perineal sections for vesical calculi.

There are from 200 to 1800 parts of calcium and magnesium bicarbonate to 1,000,000 parts of so-called hard water. When boiled the  $\text{CO}_2$  is expelled, leaving only the carbonate which, insoluble in water, precipitates and forms boiler or tea-kettle scales. Of course when these salts precipitate in the urinary tract it is not from boiling; we must look for some other cause. Dr. Swan, who did more than 2000 lithotomies in China, states that the drinking water has but little if any influence. He had the most patients from districts where the water was all right. He concluded that, at least with the Chinese, "poor nutrition, bad hygiene and continuous disregard for laws of health are prominent factors in the causation of stone."

Foreign bodies will precipitate urine salts in practically every case if allowed to remain long enough. And how long is that? A day or two in some, many days or weeks in others. Smooth substances, as glass or very smooth rubber catheters, become covered very tardily while a string (suture), rough catheter or rough foreign body of any material may be surrounded by an appreciable layer within a few days. The process seems very much like the formation of rock candy crystals about a cord suspended in a solution of sugar. What happens when a foreign body remains within the urinary tract? At first there is irritation, then infection. Jumping at a conclusion, one would think it must be the infection that is the cause. Further support of this conclusion may be in the experiment of placing a piece of tin in the bladder with no precipitation of the urine salts, probably because of the antiseptic action of the tin. On the other hand, there are hundreds of urinary tracts that are badly infected, but without stone formation.

Other explanations are that uric acid may damage the epithelium, or bacterial action may cause a catarrhal condition,

thus producing organic material for a nucleus. The normal suspension of colloids in the urine may be precipitated by nucleic acid or other acids. Chemically speaking, this is a precipitation of a colloid by an electrolyte. Ferments may precipitate fibrin, which in turn may become a nucleus. Experimental trauma of the kidney, such as needling, may produce urinary sand or slight pressure on the ureter may have the same effect. Every urologist has seen many patients who have developed renal calculi subsequent to a kidney injury, also patients with traumatized kidneys who did not develop calculi. Many patients pass uric acid crystals or phosphatic sand for years without becoming victims to calculus formation. If irritation and something solid are predisposing factors, how can such persons escape stone formation? Others, without warning, suffer a severe attack of renal colic, in a few hours deliver themselves of a small calculus which had formed in the renal pelvis and never develop a second. What went wrong in that person to cause a precipitation of a small amount of urine salts in one kidney, this to be delivered, and nothing more thereafter? Did not the other kidney receive the same kind of blood? But its pelvis was not the test tube in which there was a disarrangement of the normal urine colloids and crystalloids which results in stone formation.

Most patients harboring urinary calculi also have infection in the urinary tract, yet it is impossible to determine whether the infection was *propter hoc* or *post hoc*. A moderate sized calculus may be present in the renal pelvis or in the bladder without infection.

Certain agencies must be active to produce, for instance, a calculus in which calcium oxalate predominates, a process which is rather selective. Something happens and another very different salt is precipitated in the same patient in spite of the fact that living conditions and habits have not changed. We know that certain chemical types of stones are found

in acid, and other types in alkaline urine. The stratification of calculi may be alternately one type and the other. Since the concentric layers are not laid down over night, the acidity or alkalinity must have persisted for a few weeks before changing. All this time the patient has been eating the same kind of food, drinking the same kind of water and living in the same environment.

Spontaneous disintegration, or so-called fracture of a calculus, is probably due to a dissolution of the colloid matrix. If the thing that dissolves the matrix had been constantly present there would have been no calculus formation. Here is a suggestion for research work. The discovery, isolation and availability of this something may go a long way toward the "solution" of urinary calculi.

Much study, experimentation and observation by many seems to lead to the general conclusion that the causes are endogenous and not exogenous, that there is a defective or faulty metabolism that alters the colloidal content of the urine, together with a precipitation of the crystalloids, and that is about as far as we have gone. This is a problem of biochemistry. Many authors who have written on the causes of urinary calculi have closed, after a lengthy discussion of some theory, with an apology for not having found the real causes, and with the hope that their efforts would stimulate interest and further research. It is at least somewhat comforting when we fail, to hope that our failure will be an incentive to others to work harder and dig deeper.

A few research workers have contributed something that is worth while and among the most noteworthy is the work of Hager and McGath on the etiology of incrustated cystitis. It seems that their experiments have met the requirements of satisfactory proof. Space does not allow a lengthy review of their work, but suffice it to state they have demonstrated that incrustated cystitis is caused by a *Proteum ammoniae* which behaves differently from the other

six proteus organisms. *Proteum ammoniae* produces acid and gas in xylose but not in maltose, levulose or sucrose, while *Proteum vulgaris*, the most common type, acts just the opposite by producing acid and gas in maltose, levulose and sucrose, but not in xylose. If their findings are correct a step toward establishing the causes of urinary incrustations has been made. Unfortunately this is a small percentage of uroliths. Much remains to be done.

#### DIAGNOSIS

The diagnosis of urinary calculi is easy and certain in most cases. Vesical calculi should never be overlooked if a cystoscope can be introduced. Roentgenograms seldom miss, yet there are a few calculi that do not obstruct the roentgen rays and hence produce no shadow. These are principally the uric acid or urate stones which are more frequently in the bladder than in the upper urinary tract, and therefore can be seen through the cystoscope. Sometimes a stone as large as a date seed will not show on an roentgen-ray film at one examination and will at another, although the intestinal tract had been thoroughly emptied at both examinations. A negative roentgenogram with rather positive clinical symptoms must not be taken as final; several exposures should be made. We have found it helpful in some cases to have another roentgenographer make a film. This is no criticism of any roentgenographer, since one was as competent as the other. I am sure all of us have sometimes found it difficult or impossible to catheterize the ureters of a patient, and at a subsequent examination it was so easy we wondered why we had trouble the first time, or a patient comes with the statement that a previous attempt by another urologist to catheterize the ureters had resulted in a failure, and we accomplish it without delay or difficulty. Feeling our superiority we audibly realized how competent we were and could not understand how the previous examiner,

although a very skilful man, could have failed in such an easy case. Of course this is not a criticism but indirect praise of our own ability. There is an immutable law of averages that should keep us mindful of the fact that the other man has had some of our failures. In some cases the ingenuity of the best urologists is taxed to the limit in making the diagnosis of a calculus. Roentgenograms, cystoscopic examination, ureterograms, pyelograms and wax-tipped catheters must all be skilfully applied in the study of some obscure cases, and then the diagnosis may not be made until the patient comes to the office with the calculus in a bottle.

I need not dwell at length on the subject of diagnosis when addressing a group of urologists. It seems to me that one of our greatest obligations is in the home missionary field. Ballenger looks upon an appendiceal scar as a *symptom* of right-sided urological disorder. His estimate is that 25 per cent of all such cases have had at least one useless abdominal operation. This percentage is a fair composite average of all urologists. Until those who are permitted to practice general surgery are properly trained, it is the urologist's duty to continue his preaching the gospel of careful study and examination of patients before rushing them into a hospital in the evening for an abdominal operation the next morning, except in well-defined cases of emergency. We have been, and will be, misunderstood, charged with ulterior motives, but this should not deter us from discharging our obligations.

The differentiation between cholelithiasis and nephrolithiasis is important and by it disappointment and chagrin can sometimes be avoided.

#### TREATMENT

All agree that urinary calculi are abnormal, that they cause damage in direct relation to their location, size and number, and that they should be removed. It is not my intention to discuss at this time the various procedures generally used for the

removal of these calculi except as they may have some bearing on the ultimate results.

Phosphatic or uratic sand is not a surgical condition, yet through desperation in one case I was guilty of doing a nephrotomy, and establishing continuous drainage through the nephrotomy wound. Frequent ureteral catheterizations had rather definitely proved that but one side was producing the sand. Pelvic lavage and internal medication failed, and so did the nephrotomy. Ten years have come and gone, but this patient is as uncomfortable as ever, at times incapacitated. He is with us yet not because of our treatment but rather in spite of it.

An old treatment of urinary colic and the prevention of calculi prescribed by one layman for another was carbolic acid, in very small doses, of course. Dr. Porter has shown how it really acts as a preventive in a kidney that is throwing out too much uric acid by going into the blood as carbolate of soda and as such meeting the uric acid in the kidney to form soluble urate of soda. Probably it is not very helpful in case of other urine salts. Since patients having phosphatic calculi are usually on a low protein diet, one feels that perhaps that is a causative factor, and a diet containing more proteins is advised. Hinman operated for removal of a ureteral calculus on a child about eight and one-half months old, who had never been given water to drink, only mother's milk and condensed milk. Whether the absence of water was the cause of the calculus or not, all individuals should drink freely of pure water. Just now there seems to be a rather general epidemic of excessive water drinking. Everybody is advocating the ingestion of large quantities of water, not pints, but quarts or gallons daily. I read somewhere a short case report in which the patient, a sufferer from a calculus, used an excessive amount of table salt, therefore sodium chloride is a general cause of calculi! If true, the removal of salt from our daily diet should go a long way toward lessening the number of cases of calculi.

Almost every one with urinary discomfort prescribes alkalies for himself, usually bicarbonate of soda. The medical profession is largely responsible for this general alkalization of the public. Apparently no one stops to think that alkalies may already be in excess of normal. If an individual is over-alkalinized he may develop a calculus of calcium salts, in which case further alkalies would add fuel to the flame. In such cases acids are indicated. On the other hand, alkalies are indicated in cases of uric acid stones. All this seems rather fundamental, but we are prone to overlook the fundamentals at times. A few years ago Ochsner recommended drinking only rain water to prevent a recurrence. Because several patients had done this and did not have a recurrence the rain water was hailed as a certain prophylactic. It has failed with some of my patients.

Ultimate results following removal of calculi in the upper urinary tract depend on both the operation and the operator. Notwithstanding the fact that statistics seem to show that recurrences are almost as frequent after pyelotomy as after nephrotomy, I am convinced that pyelotomy is to be preferred in all cases where the calcareous material can be completely removed through such an approach. If there is much infection the pelvis can be drained and irrigated for several days through a tube anchored into it. The avoidance of damage to the kidney with primary and a possibility of secondary hemorrhage recommends pyelotomy. In many cases there is no choice and nephrotomy must be performed. The kidney should be handled with the utmost gentleness, care being taken to avoid useless bruising or squeezing, and the incision through the kidney should be as small as is consistent with rapid delivery of the stone or stones. Complete removal of all calculi and all fragments as well as the sand that may be present is very important. Many years ago it was my privilege to observe considerable kidney surgery done by Prof. Israel of Berlin. Following the

removal of the calculus he forcibly flushed the renal pelvis through the nephrotomy wound by using a large hand syringe, thus washing out small fragments, sand, mucus and pus. If the kidney showed marked evidence of damage from the calculus and pyelitis a large drainage tube was placed through the nephrotomy wound into the renal pelvis for drainage and irrigation which were continued for a week or ten days. All this seemed so logical to me that it has been frequently used and I do not recall a case of recurrence where this technique was employed. Pelvic lavage through the ureteral catheter following removal of renal calculi theoretically has much to recommend it as a prophylactic measure. To be effective it must be done many times at short intervals. Patients generally do not take kindly to this treatment. They neglect to appear regularly for treatment and of course it fails.

Many cases of silent calculi and of bilateral calculi should not be treated surgically. Unless the urologist feels certain that an operation in such cases will save or prolong life he is not justified in advising operation. Bilateral renal calculi are sometimes discovered by accident, at a time when both kidneys are badly damaged. In some, the best results are obtained by leaving them alone and undisturbed, but of course not in all cases.

If there is any reason why ureteral and vesical calculi should not be removed I can not think of it now. When the patient is unable to deliver these calculi unaided, our duty is evident.

The best results follow the removal of ureteral calculi when there has been a minimum of surgical injury to the ureter and the vesical portion of the ureter is thoroughly patent. The patency can be determined at the time of operation by passing a small bougie through the ureter into the bladder. In some cases it is necessary to introduce a catheter into the ureter transvesically and leave it there many days after the operation. Since there can be no argument about the advisability of



removing vesical calculi, then the only point of disagreement is the method of removal. From the time of Hippocrates to 1561 A.D. vesical calculi were removed through a perineal section. Peter Franco, a French surgeon, about 1561 did the first suprapubic cystotomy for removal of a stone. He had failed to remove a vesical calculus the size of a hen's egg through the perineum of a boy two years of age and was forced to do it suprapubically. The boy lived. For some reason or other the suprapubic approach to vesical calculi did not become popular until rather recent years. Now the choice is between suprapubic cystotomy and litholapaxy. Litholapaxy requires more skill and more time than cystotomy. It has the advantage of a shorter convalescence and a bladder that has not a surgical scar. A second litholapaxy can be done as easily as the first in cases of recurrence, while each succeeding cystotomy becomes more difficult. When there is an enlarged prostate or stricture of the urethra acting as a predisposing factor it should of course be given proper attention. A roentgenogram of every vesical calculus should be made before attempting litholapaxy, as there may be a foreign body within the calculus that can not be handled properly with the lithotrite. In such cases a cystotomy is indicated.

#### END-RESULTS

In nephrolithiasis the best results are obtained when the calculus is removed before extensive and permanent damage has been done to the kidney. Unfortunately, in some cases considerable damage has already been done before the patient is aware that something has gone wrong. The advisability or urgency of an operation is not proportionate to the size of the calculus as it is sometimes imperative to remove a small calculus that is obstructing the upper end of the ureter, causing the patient great pain and discomfort with concurrent chills and fever, while a larger silent calculus may remain a long time without much disturbance.

Precipitation of urine salts does not take place as rapidly in the upper urinary tract as in the bladder. Some renal calculi do not show much increase in size in months or years, others develop more rapidly, but all grow larger. The calculus that does not interfere with drainage of the renal pelvis is not as harmful as one that does, but eventually pyonephrosis with renal destruction is quite marked, kidney function is diminished, until ultimately the renal parenchyma is completely destroyed. Instead of renal destruction with formation of a pyonephrotic sac, the kidney may be destroyed and in its place a sclerolipomatous mass is found.

The best results in vesical calculi follow litholapaxy when it can be performed. Recurrences will not be frequent if there is complete removal of all fragments. We have seen vesical calculi develop after prostatectomy where no calculus was present before operation. Such a calculus being removed by litholapaxy, was followed in a few months by a recurrence, which was treated in the same manner, even to the third litholapaxy, which terminated stone formation in that patient.

*Recurrences.* The formation of a second calculus in either the upper or the lower urinary tract after the removal of the first is probably more frequent than we know. Statistics are difficult to gather and therefore are very meager if not misleading. Freyer said recurrences are so frequent that only those cases in which there are serious symptoms should be operated on. Reports vary from 10 per cent to more than 50 per cent of recurrences and uneured patients. Removal of a small or medium-sized calculus through a pyelotomy incision is less likely to be followed by recurrence than when the calculus or calculi are removed through a nephrotomy. Recurrence is more likely to follow operation for multiple calculi than for a single calculus, one or more being overlooked at the time of operation. Failure to remove all calculi and all fragments will soon be followed by return of symptoms. However, this is



not a recurrence, but a continuation. Nephrectomy forestalls any recurrence in the kidney removed, but a calculus may develop in the remaining kidney.

Recurrences in the earlier years of life are more frequent than in later life. Primary calculi occur most frequently between the ages of fifteen to thirty-five years. This may properly be called the "stone age." The conditions, whatever they are, that predispose to the formation of calculi in this period of life, are present after calculi have been removed and may cause a second precipitation of the calcareous content of the urine with stone formation. The cause or causes of calculi not being known, prophylactic treatment and advice so far have been uncertain and unsatisfactory. The amount of lime salts taken into the system can be reduced by drinking only water free from lime salts. The prophylactic value of this measure is not positively established but it can do no harm.

Theoretically, the functional ability of a kidney from which a calculus has been removed would be proportionate to the condition of the kidney at the time the operation was performed. The removal of an obstructing calculus will improve the renal function. Pyelotomy does not mechanically disturb the kidney and the function is not impaired by the operation. Nephrotomy adds damage to an already injured kidney and should be followed by diminished function. Yet patients with but one kidney and upon whom nephrotomy is necessary, have their renal function improved sufficiently to keep them in apparent good health and allow them to follow their business pursuits actively for many years.

In summarizing the end-results of removal of renal and ureteral calculi, it may be stated that although a very large percentage of such cases are not perfectly well in the sense that they have normal kidneys remaining, yet the operation is often imperative and many lives are saved. There are recurrences. The frequency of recurrence depends to some degree upon

the thoroughness and completeness of the removal of all calculi and fragments at the time of the operation. A kidney that objectively seems of but little worth will often do valiant service if allowed to remain with the patient. This fact argues rather forcefully for the conservation of a kidney whenever possible. The operative or surgical mortality from the removal of urinary calculi is not high, if sound judgment is exercised in deciding on what is the best thing to do as well as when it should be done, and providing the operation is done with skill and gentleness.

When more is definitely known about the causes of urolithiasis, more certain prophylactic measures against primary and recurrent calculi can be utilized. Until then it will be the duty of the urologist to study each case carefully and do what seems to be indicated for the patient's welfare.

### Discussion

DR. OSWALD LOWSLEY: Whenever Dr. Smith presents a paper it is always complete in detail and most instructive. I appreciate particularly the emphasis he placed on kidney surgery, although I might be tempted to take out some of the stones which he allows to remain. His point concerning removing one kidney and leaving the stones in the other is one that I shall follow more frequently in the future. There have been many methods of determining whether all the stones have been removed from the kidney. At the New York Hospital clinic we make a fluoroscopic examination of the kidney on the table. Quimby's plan of exposing dental films on the table is good, but a still better method has been devised by Dr. I. S. Hirsch of New York. He has devised a fluoroscopic screen that retains the shadow for one to two hours; it can be put in a black box, and the operator can see what is on it without waiting for a roentgenogram to be made.

Ureter operations are becoming less and less frequent, and they should be. This has been brought about by the method of dilating the ureters devised by Dr. Crowell and others, allowing the stones to pass out. If the patient has not persistent fever or persistent, unbearable pain, the ureter should be dilated as many times as necessary to get out the stone. The

ureter operation is a very uneconomic thing. When we open a ureter we have to deal with a cavity filled with urine, usually infected, than which nothing is more likely to cause scar formation, and the result is stricture of the ureter. I have known some very difficult and trying cases. I recall one man at Bellevue who was a constant source of surgery to us because he developed a stricture; we did not use the dilator in those days and we had a terrible time with him. So ureter operations are more to be avoided than any other; but if the patient has fever or unbearable pain, we must operate.

As to stones in the bladder, it seems to me that litholapaxy should rarely be done, for it is more dangerous than suprapubic removal. It was devised when aseptic surgery was not so perfect, and, while it does shorten the stay of the patient in the hospital, it causes trauma and is liable to cause uremia. The study of stones offers one of the greatest fields for research remaining in urology.

DR. BENJAMIN BARRINGER: This has been a very happy and thorough presentation of the subject. Dr. Smith spoke about washing out the pelvis after the operation. That has been suggested by Hunner and some of us believe that his theory may be right in part and stones may be formed by some stricture in the lower ureter. Hunner believed that the ureter should be dilated very wide after the operation. I had a case with the ureter full of stones. The patient was very fat, had a high blood pressure and a good deal of kidney pain, and fever. I did not take the kidney out, which would have been the operation of election. I irrigated it and got it grossly free of stone, and left the kidney in. The patient got along very well, but had subsequent symptoms of sepsis, and the only way to relieve him was to give him wide dilatation of the ureter. I believe this is a very good procedure where one does not do the ideal operation.

DR. HOWARD S. JECK: I can only endorse everything Dr. Smith has presented to us on the subject of urolithiasis, even to his pronunciation of the word *ureter* with accent on the second syllable. I think what Dr. Lowsley has said about conservative methods in dealing with renal calculi should be emphasized. I feel that many kidneys whose drainage is interfered with by calculi, to the extent that they seem hopelessly lost, will come back if given a chance.

I also agree with what Dr. Smith said concerning Dr. Ballenger's sign, and this reminds me of Dr. Keyes' axiom: "The operation for chronic appendicitis is frequently justified by the subsequent silent passage of a stone from the right ureter."

DR. NATHANIEL P. RATHBUN: I too extend my congratulations to Dr. Smith for his excellent presentation and particularly for being able to compress so much that is interesting and instructive in a relatively short paper. I subscribe heartily to what he said about the importance of educating the general surgeon up to an appreciation of the necessity of requesting a urological survey before subjecting patients to operation for obscure abdominal pains. I do not think that any of the surgeons in the hospital where I do my work would consider opening an abdomen in such a case without such an examination.

I go a bit further perhaps than Dr. Smith does, in not being contented with a simple roentgenogram, but advising a complete examination, including roentgenography, cystoscopy, pyelography and ureterography, all at the same sitting. It seems to me that in this way we save a great deal of time and even get a great deal of information that we would not otherwise get. We learn the type of pelvis with which we are dealing, which might influence us in selecting the type of operation for a given case. Furthermore, we get considerable information as to the amount of destruction that may have gone on in the kidney and the pyelogram will often indicate even better than the dye tests the functional capacity of the diseased kidney.

The only possible exception I can see to a routine pyelogram is the remote possibility that it might do some damage and inasmuch as we do eight or nine hundred pyelograms every year in our clinic and we have no serious reactions, this is obviously not much of a factor.

I agree with Dr. Smith's conservative attitude about some of these bilateral calculi, although I am frank to confess that I should have operated on some of them.

One or two little points about ureter calculi: I believe that the great majority of them pass spontaneously and most of the remainder will pass following simple dilatation, leaving only a small minority that require operation.

I believe that the position of small stones in the ureter, those a centimeter or less in diameter, as indicated by repeated roentgeno-

grams, is a very important point in determining the procedure. If the position remains absolutely the same, after repeated roentgenography, it is fair to assume that the stone is fixed and will not pass as a result of simple measures. I have operated on a few such cases and found the calculus so firmly imbedded in the mucosa that no amount of dilatation would have moved it.

I believe that a routine roentgenogram immediately before operation is a valuable point. I have been embarrassed by failing to find a small stone at pyelotomy and subsequently finding it well down in the ureter.

I think it is tremendously important to make some kind of roentgen-ray examination on the table immediately following operation. The method that Dr. Lowsley mentions is very interesting. We use the fluoroscope.

Dr. Smith said the results depend on the operation and the operator. I think we might add to that the after-treatment. Many of these cases are complicated by ureter stricture and it is important that we provide for adequate drainage following operation. This can be done by simple dilatation. In fact many cases continue to complain of their previous symptoms in the absence of any recurrence of calculus, and because the presence of ureter stricture.

DR. CLARENCE G. BANDLER: All of us, I believe, are practically in accord with Dr. Smith's views, except with his statement that "in most cases of ureteral calculi the calculi should be removed." It is evident that we think that ureteral calculi should be operated upon only as a last resort, and that they should be given a chance to pass either spontaneously or by manipulation. It is well known that 70 per cent of ureteral calculi will ultimately pass or can be made to pass.

Well worth considering is Dr. Rathbun's statement that in all cases of calculi in the upper urinary tract the after-treatment of the ureter is of the utmost importance. Dilatation of the ureter will in many cases prevent the reformation of stones and frequently a calculus that has escaped observation will pass spontaneously after this manipulation. I have seen a number of examples of this sequence of events.

The question of bilateral calculi is of great importance. It has interested me for a long time, and I have come to the conclusion that the less surgery one does in cases of bilateral multiple calculi the better and longer will the patient

live. Formerly our tendency was to operate immediately on the less damaged of the two kidneys in order to remove stones and give the kidney a chance to improve; and at a subsequent operation to remove the more severely damaged kidney. I no longer adhere to this practice, but prefer to avoid surgery in these patients; and they certainly survive longer.

DR. JULIUS J. VALENTINE: I cannot agree with Dr. Lowsley in his stand against litholapaxy, which Dr. Smith advocates. Some of us still perform the operation. I believe it to be definitely indicated in selected cases. A moderate-sized stone that is free in a bladder not too inflamed or too badly infected, can be crushed by gentle manipulation. A reasonable amount of skill is required and good tactile sense is also necessary. I do not think that cases of this type should be subjected to suprapubic cystotomy for removal of the calculus.

DR. HENRY D. FURNISS: I, too, thank Dr. Smith for his excellent paper and add my endorsement to what the others have said in regard to ureteral stricture. The strictures found in stone cases are not usually a result of calculi. It is more probable that the calculi arise as a result of stasis from faulty drainage consequent upon the stricture. We will have few recurrences after stone removals if we establish proper drainage by ureter dilatation, and remove the pelvic infection by suitable treatment. Strictures have a tendency to recontract, and the patient must be kept under observation and treatment for years, or sometimes for the rest of his life.

Dr. Smith showed some stones from patients who had referred pain to the other side. I do not think it is wise to say that a patient has referred pain from the other side. I had a case where a patient had no pain on the stone side but only on the other side, where there was a stricture and a 10 ounce hydronephrosis. So we should not accept referred pain until every urological procedure has been exercised to rule out disease on the symptom-producing side.

DR. LEON T. LEWALD: I was particularly interested in Dr. Furniss' last remark, apropos cross symptoms. I have seen errors come about by not marking the right and left side of the roentgen-ray film, resulting in disaster. If the roentgenologist fails so to mark a double-coated film, no one can tell which side the shadow is on. And to make the situation still more complicated, it must always be borne in

mind that in transposition of the viscera, the kidneys are also transposed. I have personally seen 35 cases of this sort.

The question was brought up by Dr. Lowsley about the three methods of using the roentgen-ray in the operating room. Personally, I think I would rather use a film. It gives a record, and the silver emulsion on the film is more sensitive to the eye than the fluoroscopic image. That would, of course, apply only to some minute fragment of stone or a uric acid stone which might cast a very faint image. With the film, one has a permanent record of the condition of the kidney and by it can prove that he had removed all fragments of the stone. While with the fluoroscope alone or the more recent suggestion of Hirsch, mentioned by Dr. Lowsley, whereby the surgeon views the fluoroscopic image impressed for some minutes or hours on a so-called "lag screen," there is no record for future use.

DR. J. STURDIVANT READ: I agree with what Drs. Smith and Valentine have said about the harmlessness of litholapaxy in suitable selected cases. It is frequently preferable to any open operation. Dr. Smith's presentation of the subject of kidney stones has been most instructive and his emphasis that there are many cases of large stones in both kidneys which do better if they are not interfered with by operation, is needed. Many of these cases have been watched by me over many years and when there are no symptoms of continuous and unbearable pain, or no frequent attacks of colic, and yearly roentgenograms do not indicate a marked growth of the stones, I believe that they should not be disturbed. Many of these patients present symptoms of chronic indigestion at irregular periods. I have found that dilatation of the ureters and lavage of the kidney pelves, two or three times a year, will often control these symptoms.

DR. JOSEPH L. BOEHM: I wish to direct the attention of the members to the best monograph on stones I have ever read, written by Prof. Dr. H. Nakano of the University of Tokio. He studied in Europe and devoted himself to this subject. I think this volume should be in every urological library.

DR. FREDERICK T. LAU: Concerning the management of renal calculi it would seem that the pendulum of opinion swings first one way and then the other. At one time it was quite the accepted thing to perform a nephrectomy on the kidney whose function and structure had been deteriorated by a stone.

Realizing the great capacity of a kidney to restore itself to better function following the removal of an impairing cause, such as a stone, one cannot help wondering today, upon seeing a calculus in a remaining kidney, just how much function would have returned in the other kidney, sacrificed by nephrectomy because of the presence of stone.

I cannot help recalling, at this time, the result of an intensive study made by me several years ago at the New York Hospital of the cases of recurrent calculi covering a period of ten years. Each of these cases of recurrence presented some form of stasis and some form of infection, thus emphasizing the necessity of dilatation and lavage in preventing recurrence.

DR. SMITH (closing): I thank the discussants for the many complimentary things said about my paper, and also for the few differences of opinion.

My reasons for the adoption of litholapaxy were given in the paper. True, it requires more skill to crush a vesical calculus than to perform a suprapubic cystotomy, yet the advantages to the patient justify the development of such skill. When properly done litholapaxy is perfectly safe.

After the removal of a calculus from the ureter a bougie should be passed retrograde into the bladder in order to dilate any stricture or ureteral angulation that may be present. If there is marked obstruction the bougie may be left in place for several days. Weeks or months later transvesical dilatation of the ureter or an indwelling catheter may be necessary to establish free drainage into the bladder and close the ureteral opening made when the stone was removed. If there is an ureteral stricture it will behave about the same as urethral stricture and will need repeated dilatations.

I entirely agree with Dr. Jeck as to the value of a urological examination of all patients who have vague abdominal pains. Valuable information is thus obtained and the location of the lesion often determined. The various methods used in making such an examination should be employed in complex cases.

Some of the ureteral and pelvic calculi are very elusive; they are not where previous roentgenograms seemed to locate them. Fluoroscopic examination during the operation is very difficult, and requires skilled help to do it accurately. I saw Quinby put the small roentgen-ray plate in the surgical wound

behind the kidney and the developed film was helpful in locating a small calculus. By using a table with a built-in Bucky diaphragm when kidney surgery is done, roentgenograms can be made at any stage of the operation to aid in locating the stone or just before closing the wound to determine whether all stones or fragments of stone have been removed.

If I gave the impression that all ureteral calculi should be cut down upon and removed surgically I did not intend to do so. Ureterotomy is indicated when it is obvious that the calculus is too large to pass into the bladder, or after repeated efforts to bring it through the natural channels have failed.

Pain is not frequently referred from the pathological to the normal kidney, yet when a pathological condition has been corrected in one side and the pains that were in the opposite side are relieved there seems no explanation but that of referred pains.

## PRESENTATION OF SPECIMEN AN UNUSUAL URETERAL STONE

I. C. RESHOWER, M.D.

(By invitation)

This specimen is presented merely as a freak of rare occurrence. No ureteral stone nearly its size has been reported, but Hugh Young mentions one about the size of a small cigar.

This patient passed a thin stone, three inches long, twenty-five years ago. She has had three children, all difficult labors, and two miscarriages. During one of these pregnancies she had severe nephritis and passed bloody urine.

On April 28, 1926, she suffered severe paroxysmal pains on the right side, radiating down the back and to the pubes and a dull backache on the left side, with dysuria and urinary frequency. On June 1, 1926, a roentgenogram was taken (Fig. 1). A few days later, after the pain had somewhat lessened, cystoscopy revealed a very much distorted bladder, with a large pouching on the left side, which was difficult to enter with a catheter. The right ureter was easily entered, but an obstruction was encountered at about the junction of its upper and middle thirds. Pushing by this obstruction and using suction, a small amount of syrupy fluid was brought down. Chemically it was nearly pure uric acid.

A phenolsulphonphthalein test at this time

showed no color from the right ureter; but it came through at another point rather high on the left side in nine minutes. It was very evident from this that there was more obstruction from the small stone in the right ureter than from the huge one in the left, which was porous and laminated, as the specimen shows. After several dilatations of the right ureter the smaller stone passed. At one of these cystoscopies the left ureter was entered and a No. 3 catheter was passed by the larger stone with difficulty. Injecting a few drops of



FIG. 1.

liquid petrolatum aided much in accomplishing this.

At no time was the left ureter blocked by the very large stone, but the small stone blocked the right ureter and caused the hydronephrosis seen in the roentgenogram. With the passing of the smaller stone the patient was fairly comfortable and refused further treatment.

On September 5, after a long automobile ride and a very active day, she was taken with severe pains in the left side and back, vomiting and sweats. I was away at the time. Dr. J. Edward Dolan, who had been following the case and knew its history, was called; and he operated the next day. Through a lumbar incision about 5 inches in length, the left ureter was exposed and opened. The ureteral wall

over the stone was  $\frac{1}{8}$  inch thick. Gently rotating, the stone was extracted. The lower  $1\frac{1}{2}$  inches of the ureter was sewed with chromicized gut, a tube drain was placed in the upper opening, and a periurethral drain was inserted.

Convalescence was good up to the thirteenth day when the patient developed a temperature of  $104^{\circ}\text{F}$ . This subsided in a day or two with the passage of a large amount of pus from the bladder. She left the hospital eight days later and has been very comfortable ever since. She has no urgency and only slight frequency.

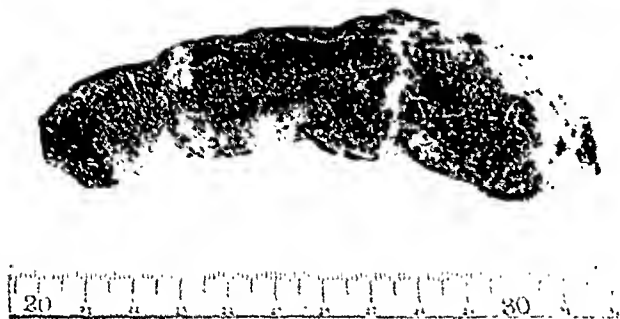


FIG. 2.

Urinalysis shows pus, and a few granular and hyaline casts.

On cystoscopy two days ago (January 17, 1927), the left ureter, almost at the top of the bladder, was entered with difficulty, and the pouch caused by the stone is still evident. Function tests show color in about eleven minutes at both ureter openings. This delay I attribute more to the nephritis than to obstruction.

#### Discussion

DR. LOWSLEY: This is a most interesting case. I have never seen a stone like it. It is of most unusual size, and I congratulate Dr. Reshower upon being able to show it and upon his result.

DR. B. S. BARRINGER: Did Dr. Reshower get the catheter up the ureter through to the kidney? It is a very interesting point, if you can save the kidney.

DR. LAU: Was a pyelogram made?

DR. RESHOWER: No pyelogram was made. Cystoscopy was done in the office and we had no facilities for making a pyelogram there.

Replying to Dr. Lowsley—credit must not be given to me; most of it should be given to Dr. J. E. Dolan. There was quite a little difficulty in removing the stone, and he had to rotate it almost as if we were taking out a tight sound.

## PRESENTATION OF NEW APPARATUS AND INSTRUMENTS

### A NEW TUBE FOR SUPRAPUBIC SUCTION DRAINAGE OF THE URINARY BLADDER

FRANK W. HARRAH, M.D.

(By invitation)

It has been the practice for a number of years at the James Buchanan Brady Foundation of the New York Hospital to drain the urinary bladder for a suitable period of time through a suprapubic incision by the use of a suction apparatus. This practice is followed principally in cases requiring a subsequent prostatectomy and, more recently, in some cases of external urethrotomy, with the sole idea of reducing the patient's toxicity more efficiently and more rapidly than by the use of syphon drainage of the bladder through the urethra or otherwise, as manifested by a gradual increase of the phenolsulphonphthalein output, a decrease of blood urea nitrogen and a steady improvement in the patient's general condition, all of which are accelerated by an adequate intake of fluid.

Suprapubic suction drainage of the bladder is, of course, not new, but the fact that the method of application of the principle has not been as satisfactory in the past as it seems to be at present renders one enthusiastic and eager to try something a little different.

Practically all cases drained by the suction method in our experience present wounds that are healthy, dry and clean and devoid of the foul, ammoniacal odor of decomposed urine. It seems that in cases of prostatic obstruction, where the patient is old and feeble, with or without complications such as a bladder diverticulum, and having badly damaged kidneys, a chronically infected bladder, or both, suprapubic suction drainage acts in a very gratifying manner by clearing up the infection and foul odor of the bladder and increasing the resistance of the patient. Thus it diminishes the amount of urea nitrogen in the blood and creates a more satisfactory renal function than any other method of drainage with which we have had experience.

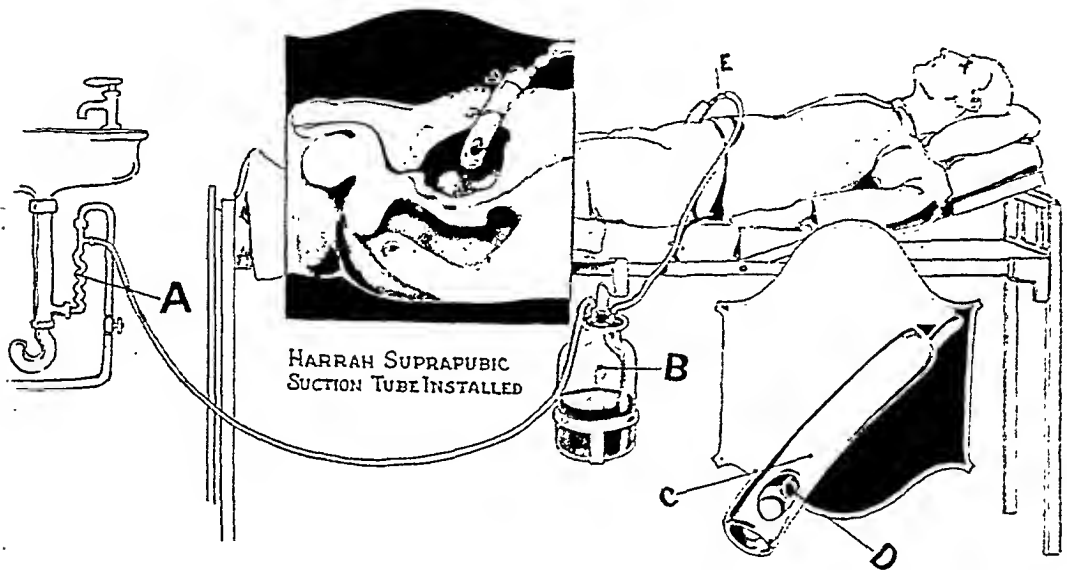
Furthermore, the bladder is drained thoroughly of all its infected residual urine; the opportunity of an ascending infection through frequently dilated ureters is lessened and the



edema of the prostate and the bladder tissues subsides to a marked degree. The patient feels comfortable and since the operation is performed under local anesthesia, he is subjected to little if any shock.

It appears that suction drainage of the bladder is of paramount value especially in such extreme cases as all of us so frequently see. We know that syphon drainage of the bladder permits a constant residuum; that the opening at the terminal end of the catheter frequently becomes obstructed with blood clots, detritus,

cm. in diameter. There is another rubber tube (D) 17.5 cm. in length and 1 cm. inside diameter, vulcanized to the inner wall of the outer rubber tube in such a manner that the lower extremity of the inside tube, which is oval shaped, is on a direct horizontal with the upper aspect of the two lateral fenestrae of the outer tube. The inner tube projects 5 cm. above the upper extremity of the outer tube, in order to facilitate the connection with the remainder of the apparatus. An air space 0.5 cm. in diameter is therefore left between the inner and outer



etc., causing either distention of the bladder or wet dressings and bed linen, which make the patient unhappy by their offensive odor, and render frequent change of dressings imperative.

The accompanying diagram illustrates the principle of the method of suprapubic suction drainage of the bladder as employed at the New York Hospital by the use of Bunsen water suction pumps, marked (A) in the diagram, attached to the water pipes in every ward and room. With water for pressure a partial vacuum is produced in the system, and the apparatus functionates accordingly; the urine being collected in the container (B).

A No. 20 Eynard rubber tube (C), 15 cm. in length, with inside diameter of 1.75 cm., presents two oval shaped lateral fenestrae, each 1.5 cm. in length and 1 cm. in diameter. These are placed 1 cm. from the terminal end of the tube, which is open, and which is 1.75

rubber tubes in order not to create a complete bladder vacuum with its associated pain and subsequent stoppage of the plant. This air space is also used for irrigation of the bladder while the suction apparatus is at work, thus keeping the bladder in a healthy and aseptic condition. Such irrigation is practiced in our wards twice daily in all bladder drainage cases, with excellent results.

If by chance the inner tube becomes clogged with clumps of devitalized bladder tissue, phosphatic deposits, blood clots, etc., the tube can readily be cleaned without removing it from the bladder by simply disconnecting the suction at the point (E), inserting a long grooved director through the lumen of the inner tube and twisting it about several times. Upon withdrawal of the director, the groove is found to be filled with the sediment which had collected upon the wall of the inner tube. However,



such a procedure is rarely necessary, especially if several syringefuls of boric acid or acriflavine solution are forced down into the bladder between the tubes every morning and evening while the suction is on. This sort of irrigation is of great value, not only for mechanical reasons but for therapeutic results in keeping the interior of the bladder clean.

These suction tubes are made in France in size Nos. 20 and 24, the latter being of larger caliber than the one described above.

The old style rubber suction tube devised by Kenyon at the New York Hospital many years ago would frequently cause the patient much distress, for the inner tube would often slip down and impinge upon the mucosa in the region of the bladder neck. These patients would complain of pain at the end of the penis and loss of time and discomfort were involved in reinstalling or adjusting the tubes. These tubes were held together by rubber bands, safety pins or adhesive tape, rather than being of a single unit.

The suction tube functionates best when inserted into the bladder for a distance of 1.5 cm. to 2 cm. above the lateral fenestration of the outer tube, with the air space between the two tubes facing anterior to the inner tube. The tube should be placed in the uppermost aspect of the bladder and fastened securely to the bladder wall with catgut, tied around the tube. The tube is then brought out through the extreme upper angle of the suprapubic wound where it is again fastened to the skin by tying a silkworm-gut suture through the skin and then around the tube. A cigarette drain to the space of Retzius is placed just anterior and below the suction tube.

The suprapubic suction drainage here described effectually removes fluid as it accumulates in the bladder, without any spilling, overflow or odor of urine in the ward; it allows for a large amount of air to circulate through the bladder, which in itself inhibits the growth of many bacteria, and dries and heals the inflamed bladder, in a satisfactory and efficient manner.

### Discussion

DR. J. H. MORRISSEY: Dr. Harrah has accomplished a great deal by simply vulcanizing the inner tube to the outer tube. Heretofore the difficulty with the suprapubic suction arrangements has been that the inner tube was liable to slip down in the bladder and impinge upon the bladder neck. It was fastened either

with a safety pin or with a simple piece of rubber which would not hold it. This principle of suction drainage on a large scale is made possible only by my own suction drainage apparatus which I have never described; and I take this opportunity to do so, if I may.

It is a combination of the ordinary Chapman water pump and the plumbing system of the institution. One reason that we do not use more suction is that it is not available and one may not attach the water pump to the faucet and leave it running continuously. At the New York Hospital we have an arrangement where the water pump is incorporated into the water system by an extra feed-line and then attached directly to the waste without running through the bowl. Two hand valves control the flow and the apparatus can be utilized without interfering with the regular toilet facilities. These pumps cost about three dollars and the plumbing can be put in by the institution employees. We have twelve of them in the hospital and have equipped all rooms with them and are thus able to get good suction. Syphon drainage when it is properly taken care of is most satisfactory, but a group of ward cases to which one cannot give personal attention will be kept drier and much more comfortable with a good suction apparatus and tube.

DR. J. SYDNEY RITTER: On the urologic ward at the New York Post-Graduate Hospital, we use suction drainage for our bladder cases. The water suction is produced by the use of the old Sprengel type pump. These are located in an anteroom adjacent to the ward. From this point, suction is carried to each bed in the ward by means of a small caliber metal tube. For our private room service, we use an automatic, interrupting, high-speed, electric pump, devised by Dr. Joseph F. McCarthy and myself. This is a portable outfit.

Regarding the suction tube of Dr. Harrah, I feel it best to have a removable inner tube, because blood clots and debris plus deposits of salts necessitate the daily removal of the inner tube for cleansing purposes. Should the inner suction tube become plugged, it is necessary to remove the entire suprapubic drainage tube, which is not desired within the first forty-eight to seventy-two hours. At the Post-Graduate we have had little difficulty in keeping our inner rubber tubes in position by means of safety pins when this type of tube was used.

We use a mushroom catheter cut to fit a metal inner tube I devised about one year ago.

This metal tube has numerous perforations placed in a spiral manner so that should one become plugged the lower ones would continue to function. This long tube is passed through a metal button with a central perforation supplied with a rubber bushing, so that the suction tube may act as a plunger using the button as a fulcrum. This button has a second channel that opens on the side. This is the inlet channel, allowing the air to enter so as to avoid the production of a vacuum within the bladder; thus avoiding traumatizing the surrounding tissues. Due to the fact that the mushroom of the Pezzer catheter is difficult to introduce unless placed on the stretch, the suction tube can be pressed down, using the lateral arms of the button for the counterpressure, placing the mushroom on the stretch and making it easy of introduction and removal. The metal inner tube avoids the possibility of collapse which occurs when soft rubber tubes are used. By means of the inlet located on the button of the inner tube, we are doubly protected, in that should the suction stop for some unknown reason this inlet serves as an outflow for the urine. The tube may be inserted on the operating table.

After six to ten days, when a definite suprapubic fistula has been established, this tube is of no value, for it prevents closure of the bladder. We then use the Gile tube, which is composed of small inner and outer perforated metal tubes suspended from a circular plate. This tube is 1.5 inches long and does not extend into the bladder, thus allowing the latter to close.

### A CYSTOSCOPE FOR FULGURATION OF BLADDER TUMORS

OSWALD S. LOWSLEY, M.D.

(Author's abstract)

In this recently devised instrument, the telescope is based upon the McCarthy lens system, the result being that it deflects the angle of the optical axis  $25^\circ$  instead of the customary right angle. The advantages claimed for the instrument are:

1. It is small and easily passed into the bladder.
2. The telescope and light are contained entirely within the shaft of the instrument, thus allowing the greatest possible motility in the conduct of intravesical fulguration.
3. It has a large metal electrode at the end

of the curved portion, size 22 F, which causes extensive disintegration of a tumor mass under vision. This electrode is thoroughly insulated.

4. Continuous irrigation through the fenestra is possible, which insures a clear field at the point of application of the spark, even in the presence of considerable hemorrhage.

5. The forward or oblique-looking lens system of McCarthy makes it possible to keep the electrode in the field of vision at all times.

6. The expense of the instrument is greatly reduced by the fact that any McCarthy telescope can be used in it.

### AN IRRIGATING CYSTO-URETHROSCOPE FOR APPLYING HEAT TO THE PROSTATE AND VESICAL ORIFICE UNDER VISION

OSWALD S. LOWSLEY

(Author's abstract)

The object of this instrument is to apply heat under vision to the prostate and vesical orifice in an attempt to ameliorate not only ordinary chronic inflammatory lesions of these structures but all diseases of the prostate and posterior urethra. By it heat is intended to be applied under vision to such a degree that a draining of the tissues will result, thereby insuring permanent as well as temporary relief of symptoms.

The advantages claimed are:

1. The instrument has a large electrode for the purpose of applying heat in such quantities that a vigorous drainage of the prostate and vesical orifice results.
2. Its action is observable during the heating process.
3. Provision is made for constant irrigation.
4. Any McCarthy oblique vision telescope may be utilized in this instrument.

### Discussion

DR. LEO MICHEL: Dr. Lowsley is, as usual, very ingenious. The fulgurating apparatus seems to me to be a splendid instrument where one wants to apply a large surface and can reach a point for fulguration. Often in bladder work I have tried to reach a spot that I could not touch with the shaft of my instrument or the end of the instrument; I could not reach it with either the Bugbee or the McCarthy electrode. I have never used this instrument, but say this because of my experience with other instruments.

Concerning the diathermy apparatus, I would like to know what Dr. Lowsley means and what advantage he gains by observation under direct vision of the application of heat. He has, too, a small surface through which he applies the electric heat. I would like to know where he applies the indifferent pole, and under what conditions he uses this apparatus. The application of heat requires a larger surface than Dr. Lowsley's instrument can give. I cannot visualize the advantages of the direct vision of heat application, for if one gives sufficient heat to create a burn he is not doing his patient any good. One cannot apply heat enough to give a burn, for when the patient is uncomfortable the operator must cease; and under these circumstances visualization of the heat application is not necessary, and is impossible. If Dr. Lowsley desires to apply diathermy to a very limited area under observation in the posterior urethra with this instrument, I can understand its use; but its construction does not admit of the proper application of diathermy to the prostate. I truly cannot see the advantage of the instrument.

What does Dr. Lowsley see with his instrument? We have at present electrodes for the application of the various electric modalities to the posterior urethra and the very limited prostatic area which these electrodes reach, exactly similar in construction to the Lowsley electrode except that he gains vision, as he describes it, for the application of diathermy. How can one see diathermy or heat?

DR. JECK: I should like to ask Dr. Lowsley whether he has tried his new fulgurating cystoscope in bladder neck conditions, such as a median bar. I did not understand whether or not he thinks it is applicable to that type of operation.

DR. C. W. COLLINGS: I think Dr. Lowsley's fulgurating cystoscope may be usefully applied to large papillary tumors of the bladder with a large pedicle. With a large electrode and a

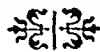
strong fulgurating current large tumors may be destroyed the more quickly. I would like to know what type of machine he uses.

DR. LOWSLEY: I appreciate the discussion of these new instruments, realizing that it is difficult to discuss a thing with which one has had no experience. Dr. Michel has made some very appropriate remarks. The mobility of the fulguration instrument is very practicable. I have not tried it on a great number of tumors myself, for I devised it only within the last few weeks; but where I have tried it I have had no difficulty in reaching the tumors. I can easily see how a small tumor way up in the bladder might not be easily reached, but that is very rare, so I think the mobility is very satisfactory.

Dr. Michel's criticism of the diathermy instrument may be well taken. I do not know so much about diathermy. I have felt that the devices used heretofore were blind. There have been many different reports regarding diathermy. They claim that when the tissue is properly heated there is an edema and an exudation of fluid.

The urethra runs through the prostate. You can apply heat to the prostate through the urethra. If you apply heat to the posterior urethra, it affects the prostate. The electrode at the end of the shaft of this instrument presents quite a large surface and a current of 600 ma. to 700 ma. is sufficient to get a good drainage reaction. I do not think this is valuable for every prostate but it is for that type of prostate which does not respond to the ordinary treatment.

Dr. Jeck spoke of the bladder neck keratoses. I do not approve particularly of applying this instrument to bladder neck lesions, because while one can see perfectly well inside the bladder one really cannot see very well just inside the neck. Theoretically, according to our other McCarthy instruments, it should allow vision there, but unfortunately it is practically valueless.



## EDITORIALS

### THE MOVING PICTURE IN MEDICAL TEACHING

MORE than twenty years ago, when the moving picture was still in its infancy and bore the name, in this country, of "vitascope," we ventured an editorial prophecy (The JOURNAL, May, 1906) on The Stereoscope, the Vitascope and the Phonograph in Medical Teaching. Therein we said: "The vitascope serves to dissect and to delineate the composite acts involved in the normal movements of animals and of human beings. Why not also abnormal movements? The question at once suggests a wide range of diseases in which abnormal gait (coxitis, tabes, spastic paraplegia, pseudo-hypertrophic muscular palsy, etc.), irregular muscular activities (chorea, athetosis, paralysis agitans, myokymia, nystagmus, etc.), and convulsions (hysteria, epilepsy, eclampsia, etc.) can, by means of moving pictures, be permanently recorded in every detail for comparative study and comparative demonstration. Many surgical procedures involve certain details of technique not always easily made clear by description or by means of photographs, etc." At that time a few moving pictures had been made by or for individual physicians or surgeons, but they were only crude novelties. As years went on other physicians experimented with the cinema, but the efforts, although rather more successful, were still only sporadic.

Ten years after the first we wrote another editorial (The JOURNAL, March, 1916) on The Teaching Value of the Moving Picture and the Phonograph in Surgery, to which we gave the subtitle, A Prophecy in Fulfilment, because at that time "The Clinical Film Company" of New York was producing some excellent moving pictures of surgical, including dental, operations, was developing the

nucleus of a valuable collection of these, and had exhibited them or loaned them for exhibition before many medical societies and college classes. Their work gave great promise of practical success. But the expenses of experimentation, of free picture-taking and demonstration, were very large, and the cost of this pioneer work in introducing moving pictures into medical teaching on a large scale was probably too great for a limited private enterprise. At any rate, this and one or two other such commendable commercial ventures were abandoned.

Another decade passed without the establishment of the moving picture as a regular part of medical teaching. All its obvious advantages as to clearness of demonstration, size of audience, permanent preservation, have thus far gone unutilized so far as any systematic plan has been concerned. Now, however, such a plan is in sight. At the last meeting of the American College of Surgeons in Montreal a committee was formed to formulate procedures for the development of the cinema as an adjunct to medical teaching. In December, 1926, the committee met in Rochester, N. Y., with Will H. Hays, president of the Motion Pictures Producers and Distributors of America, George Eastman, head of the Eastman Kodak Company, and several other representatives of that company, and initial working plans were adopted. Mr. Eastman offered the technical resources of his Company and the cooperation of the School of Medicine and Dentistry of Rochester for experimental efforts. Thus can be solved all the lighting and photographic problems that are involved in this special field of work; but such excellent pictures have been taken in years past

that we feel sure these problems will present no great difficulties. Started under such auspices, and with the dynamic Director-General of the American College of Surgeons to push the beneficent enterprise, it will probably not be many years before our medical schools have complete film libraries of standard surgical procedures as performed by their originators or by the leading surgeons of the world.

With color photography, motorial and certain tropical diseases may be brought close to any student and may be studied again and again. In place of the few craning their necks in a surgical amphitheater to get an occasional glimpse of an operation, usually at a distance of several feet, the moving picture, enlarged to any desired size, will show to hundreds comfortably seated every step of the operation in clear detail. The technique may be emphasized by "the slow motion" device, and the tissues can be seen in their natural colors.

The phonograph, that other great inven-

tion of Edison, will not be needed, but the "vitaphone," to the development of which he also made important contributions, can be a part of the film wherever needed or desired. And so, without travelling to Philadelphia, Boston, Cleveland, hundreds of students and physicians may see the nimble fingers of Deaver perform a laparotomy and hear the whimsical comments of that veteran teacher, may watch Cushing perform, and demonstrate with scholarly diction, the removal of a brain tumor, may stand beside the dextrous Crile while he skilfully operates upon a goiter and while he discusses his methods and discourses upon anociation. The fingers and the voice of Chutro in Buenos Aires, Bastianelli in Rome, Jones in Liverpool, will be seen and heard in the schools of Chicago and San Francisco. And they will be seen and heard in the classrooms by future generations of students when these surgical masters are no longer living.

W. M. B.



#### [SURGICAL SUGGESTIONS]

**I**N SOME individuals it is exceedingly difficult to enter a needle into a vein at the elbow. The veins on the hand, a saphenous vein or, better still, the veins at the ankle can then be used. In infants, of course, the longitudinal sinus at the anterior fontanelle, is available.

**A** COEXISTENT enlargement of the spleen speaks against carcinoma as the cause of an enlargement of the liver.

**W**HEN performing ventral suspension avoid penetrating the endometrium with the needle. An endometrioma of the abdominal wall might be produced.

## THORKILD ROVSING

THE recent death of Professor Rovsing of Copenhagen has taken not only from Danish medicine, but also from the public life of Denmark, one of its most important and distinctive personalities, and from Surgery one of its most conspicuous figures.

Born in 1862, he received his medical degree in 1885. From that time until 1926, when he was forced to retire because of cardiac disease, his life was spent in actively stimulating and productive pioneer work in various fields of clinical, operative and experimental surgery. His published works number over 200 papers, including fundamental studies on cystitis, pyelography, tuberculosis of the genitourinary tract and gall-bladder diseases, and books on gastrocoloptosis, on urologic and on abdominal surgery and his collected lectures to students.

He was the founder of a weekly medical journal, *Hospitalstidende*, which he finally presented to the Danish Medical Society,

after he had acquired its ownership. At the age of thirty-seven, he was appointed professor of operative surgery at the University Hospital, and at forty-two was made senior surgeon at the Frederiks Hospital. One year later, due in the main to his own striving and insistence, the present Rigshospital was started.

The Danish Surgical Society numbered him as one of its charter members. He was the modest recipient of many honors in his own country and abroad. Some of our readers will remember his address on tuberculosis of the urinary tract at a meeting of the American Medical Association several years ago.

In 1922 appeared the Rovsing Festschrift as a tribute to his accomplishments in surgery and his reputation as a teacher.

He was an ideal man for his subordinates to work with and under, a great stimulator and organizer, an originator in surgical endeavor.



THORKILD ROVSING



# PROGRESS IN SURGERY

*Selections from Recent Literature*

SHEDDEN, WILLIAM M., Boston. The results of surgical treatment of epithelioma of the lip from the Massachusetts General Hospital and the Cancer Commission of Harvard University. *Boston M. & S. J.*, Feb. 17, 1927, cxcvi, 262.

From this study Shedden concludes:

1. The "radical" neck dissection as described will give three-year cures in 76 per cent of the cases.

2. This "radical" dissection will give 42 per cent of cures even when cancer is present in the glands.

3. Metastatic cervical gland cancer can exist in absence of palpable glands. Palpable glands do not necessarily mean cancer.

4. It is most necessary to excise chronic ulcers and tumors of the lip, if there is a possibility of cancer, and to have a microscopical examination of the tissue excised.

5. Separation of the tumors into pathological groups depending on relative malignancy is apparently of distinct value as regards prognosis and choice of operation.

6. The delay between onset and admission to the hospital, and that between the visit to the doctor and admission to the hospital is too long.

7. The position of the growth on the lip should determine whether the neck dissection is to be bilateral or unilateral.

8. More neck dissections could be done on the otherwise inoperable if sufficient narcosis and local anesthesia were employed.

9. Syphilis is not commonly seen with cancer of the lip and its presence should not delay adequate operative procedures.

10. Heredity plays a minor part in this disease.

PICKERILL, H. P., New Zealand. Excision and restoration of upper lip. *Brit. J. Surg.*, Jan., 1927, xiv, 536.

Pickerill has reported instances, in a previous communication, in young men, for whom considerable restorations of lost portions of the face had been undertaken by means of tube-grafts, including the double tube-graft flap, which he originated in 1918. He now shows by

a case report that such grafts are also successful in older men.

A man, aged sixty-five, was admitted with a large fungating growth of the upper lip about the size of a hen's egg. Pickerill excised the upper lip under local anesthesia. Six weeks later plastic restoration was commenced. The first stage was to form the new lip from two flaps, one from the chest for the inner surface and one from the scalp for the outer surface. The scalp flap is superimposed on the chest flap, united, and allowed to lie alongside the left ear for a fortnight. The lower end is then divided, swung across, and inserted in the prepared bed on the right and upper borders of the excision wound. At the next stage the graft is divided and the proximal end inserted into the left side of the excision wound. The scalp tube is opened out and replaced. The patient, of course, was enabled rapidly to grow a moustache.

A point of interest lies in the excellent substitute chest skin makes for mucous membrane when transferred by double tube flaps. The extraordinary thing is that if the same skin were grafted into the same area as a free graft, it would remain white and would never take on the appearance of mucous membrane.

FARR, ROBERT EMMETT, Minneapolis. Some shortcomings in the surgery of cleft lip and palate with suggestions for meeting them. *Minnesota Med.*, Feb., 1927, x, 70.

The following innovations are suggested:

1. The Brophy wiring may be done in two stages.

2. Postoperative manual stretching of the lip will relieve tension, increase redundancy and prevent its thinning out.

3. The nasal septum may be divided at its base to allow proper elevation of the nasal tip.

4. The prolabia may be used as a prolongation of the columella rather than a portion of the newly constructed lip.

5. Lip tension should be more often relieved by making incisions along the "laughing wrinkle."

6. Cleft lip may be closed in two stages.



7. The delayed-flap method of suture of the palate may be indicated in certain cases and in every case of failure to obtain union a secondary suture should be made during the second postoperative week.

COSTEN, JAMES B., St. Louis. Diphtheria infection of the middle ear and mastoid. Report of two cases. *Arch. Otolaryngol.*, Feb., 1927, v, 119.

In both of the cases reported, the complete solution of the infantile mastoid structure and replacement with organized pyogenic membrane indicated an infection of long duration. In one case the clinical course of the child for a year previous to the diagnosis of diphtheria of the mastoid, and the coincidence of the mother's pharyngeal diphtheria with the beginning of the child's vague troubles, is strong evidence that the patient had carried the diphtheria as a primary infection in the middle ear space without any signs in the nose or pharynx or symptoms referable to the ear. The symptomatology of diphtheria of the middle ear is so atypical that it probably accounts for the conviction that it is a rare occurrence. Although almost every surgeon sends out a swab of the wound for culture at operation, it is not grown on special media unless requested. The extent of destruction in the middle ear and mastoid is much greater than the severity of symptoms would indicate.

EDWARDS, A. TUDOR, England. The surgical treatment of phthisis and bronchiectasis. *Brit. M. J.*, Jan. 1, 1927, i, 9.

Thoracoscopy and cauterization of adhesions are a valuable aid to artificial pneumothorax treatment, especially in cases where cavities are prevented from collapsing by adhesions of the band-like or string-like type, not thicker than 1 cm. The number of cases is comparatively small.

Pneumolysis can be used as an independent procedure or as supplementary to other operations; it is of no use in bronchiectasis, where basal collapse is required and there is no point of counterpressure. It is most valuable for uncollapsed apical cavities following thoracoplasty for tuberculosis. Fat appears to be the ideal medium if enough can be obtained. As an independent procedure the results are not satisfactory as the collapse is too localized.

Phrenicotomy, or rather radical phrenico-

tomy, is of value, as an independent procedure, occasionally in the more acute forms of phthisis, where major operations are contraindicated, and in early and, on the worse side, in bilateral bronchiectasis. It is of value as a test of the activity of tuberculous disease in the so-called "better" lung previous to thoracoplasty. As a supplementary procedure it is useful in cases treated by artificial pneumothorax, either where diaphragmatic adhesions are present, or, by reducing the capacity of the hemithorax, it may prevent reopening of cavities when the lung is allowed to expand at the end of pneumothorax treatment. Supplementary to thoracoplasty, it is of much value where the compression of the major operation is found to be insufficient. Hemoptysis from basal cavities can sometimes be controlled by this operation.

Thoracoplasty offers considerable hope of amelioration or actual cure in chiefly unilateral tuberculous disease of the lung, where artificial pneumothorax treatment is impossible or unsatisfactory, and where the disease is progressing in spite of careful medical treatment. It is of use also in cases of tuberculous empyema without secondary infection. In the septic tuberculous empyemas the results are not good, but the disease is otherwise almost invariably fatal. Considerable improvement, amounting to cure in some cases, can be obtained by thoracoplasty in unilateral bronchiectasis, but this operation will not collapse the larger bronchi near the hilum, and in some cases a non-odorous mucoid sputum remains after the operation.

Pneumotomy should be reserved for localized tuberculous abscesses which are not draining well through the bronchus, and in cases in which the generalized tuberculous process appears to be inactive. In bronchiectasis it should only be used in those cases of large localized abscess formation, and not in the diffuse variety.

Bronchostomy is occasionally of great value following drainage of large abscesses; a partial plastic operation on the chest wall should be performed subsequently.

Pneumectomy appears to be almost totally contraindicated in phthisis. In bronchiectasis, although apparently the ideal procedure, it is followed at present by an almost prohibitive mortality (50 per cent). Further improvements in the technique may eventually make it the operation of choice. The more recent cautery

pneumectomy, as practiced by Graham in America, has been followed by a much lower mortality than any other lobectomy operation, and offers reasonable hope of eradication of the septic lobe.

BALLON, DAVID H., Montreal. Primary carcinoma of the bronchus with abscess of the lung diagnosed bronchoscopically and injected with lipiodol. *Med. J. & Rec.*, Feb. 16, 1927, cxxv, 225.

A man forty-three years of age presented a clinical picture of an abscess of the lung verified by operation. A bronchoscopic examination including a lipiodol injection, performed because of persistence of symptoms, revealed a growth of the left main bronchus, which on pathological examination was reported carcinoma.

The case reported is of interest, apart from the rather rare anatomical location of a primary carcinoma diagnosed bronchoscopically, from the fact that what clinically appeared and may possibly be a pure abscess of the upper lobe of the left lung was found to be associated with primary carcinoma of the left main bronchus. Further bronchoscopic investigation including a lipiodol injection tended to indicate that the abscess formation might be of a secondary nature due possibly to a mechanical block.

Although the growth took origin from mucous membrane the abscess in the upper bronchus was not bronchiectatic, which is also a point in favor of its being a pure abscess of the lung.

PARKER, HARRY L., Rochester, Minn. Involvement of central nervous system secondary to primary carcinoma of lung. *Arch. Neurol. & Psychiat.*, Feb., 1927, xvii, 198.

In four cases of primary carcinoma of the lung with invasion of the brain, meninges, spine and nerve roots, the carcinoma gave few signs, and the involvement of the nervous system was the most striking feature in each case. The clinical and necropsy records in each case illustrate the great variability in the course and tendencies of the disease and the difficulties in diagnosis. The study demonstrates the necessity of a complete general physical examination in every case of disease of the central nervous system.

ABELL, IRVIN, Louisville, Ky. Acute pancreatitis. *J. Mich. State M. Soc.*, Feb., 1927, xxvi, 77.

Acute pancreatic necrosis, acute hemorrhagic pancreatitis and pancreatic abscess are not separate clinical entities, but represent different stages of the same process, the origin of which is not entirely clear. The rapid destruction of pancreatic tissue is due to the activation of trypsinogen within the gland itself; normally this is done by the enterokinase in the duodenum. The most logical explanation for its activation within the pancreas is that it is due to a retrograde injection of infected bile or duodenal contents through the ducts, as well as a pancreatic lymphangitis. Biliary tract infections were present in more than 50 per cent of the reported cases, in 100 per cent of the series here reported.

The areas of fat necrosis commonly seen in the peritoneum, root of mesentery, mesocolon and omentum are due to the action of ferments in the escaped pancreatic secretion.

There are no pathognomonic symptoms, pain, vomiting and collapse being the most important encountered. The physical signs will depend on the stage of the disease: in some cases the lack of symptoms and physical signs is remarkable when compared with the extent and severity of the local lesion.

Laboratory examinations are of but little aid in reaching a diagnosis; for this, reliance must be had upon the history of previous upper abdominal disease, the present symptoms and physical findings. Pain radiating from the right costal margin across the upper abdomen, tenderness following the course of the pancreas, pain and tenderness to left of midline, and the detection of a mass in the pancreatic area are beacon lights when elicited. After all it is not so important to make a correct diagnosis of acute pancreatitis as it is to make a diagnosis of an acute surgical lesion in the upper abdomen. The earlier the operation the less the destruction of the pancreas, the less the absorption of toxic proteoses, the less the peritonitis and consequently the greater the number of recoveries. The indications are to relieve tension, to stop hemorrhage, to prevent leakage and to afford drainage. Pancreatostomy with tampon and tube drains in and around the focus of pancreatic destruction will best fulfill these indications. The drainage of the gall bladder, when the

condition of the patient permits, is a worthwhile procedure.

CHAMBERLAIN, DIGBY, Leeds. Acute pancreatitis. *Brit. J. Surg.*, Jan., 1927, xiv, 390.

In 13 cases the treatment was drainage of the lesser sac. In these the lesser sac was opened, usually between the stomach and transverse colon, and the peritoneum covering the pancreas was incised. The pancreas was explored with the finger, and free sloughs, if present, were removed. This exploration should be very gentle, and should never be attempted with a sharp instrument, as the splenic or other vessels may be opened. A rubber drainage tube, carefully packed off from the rest of the abdomen by gauze swabs, was then put down to the anterior surface of the gland. Five of these cases died. In the remaining 5 cases operated on, in addition to drainage of the lesser sac, a tube was put into the gall bladder. It would appear that drainage of the gall bladder and lesser sac has only half the mortality of drainage of the lesser sac alone.

Nine cases of the series gave a history of recurrent attacks of abdominal pain, situated in the upper abdomen and continuing over a number of years. For two or three weeks these attacks had been more severe, and had culminated in the real acute attack. One case, which recovered, had had typhoid fever.

Post-mortem examination in 6 of the 8 cases that died showed: single cholesterol stone in 2 cases, multiple small stones in 1, no stones in 2, congested gall bladder in 1. No case showed obstruction at the ampulla of Vater. In the two other cases there was no post mortem.

Lumbar discoloration, sometimes present, is due to a digestion of the retropancreatic tissues, which, aided by gravity, extends towards the skin of the back. In one case, after operation, a fluctuating swelling appeared below the last rib on the left side, due apparently to an extension of this process. Drainage posteriorly would appear to be rational; but unfortunately the posterior relations of the pancreas are so numerous and important that a stab through them cannot be recommended as a routine procedure.

Chamberlain has worked out anatomically what he thinks is the only possible method of posterior drainage. It consists in resecting a portion of the tenth left rib in the mid-axillary line, and aims at draining the lesser sac in the

region of the tail of the pancreas. He has not yet had an opportunity of employing it on a patient. Chamberlain concludes:

1. In acute pancreatitis there is an infection of the gall bladder, caused by a hemolytic streptococcus.

2. Infection travels to the pancreas by way of the lymphatics.

3. Regurgitation of bile along the pancreatic duct is prevented by a valve which guards its opening.

4. The treatment is operative.

5. Operation should consist in drainage of the lesser sac and gall bladder.

6. As the infection is streptococcal, serum therapy might be tried with advantage.

LADD, W. E., Boston. Congenital hypertrophic pyloric stenosis. *Boston M. & S. J.*, Feb. 10, 1927, cxvii, 211.

In a series of 197 cases taken from the Children's Hospital and Ladd's private practice, there is an 80 per cent predominance of the male. The symptoms of this disease begin commonly in the third week of life. The tumor can often be felt if a painstaking examination is made when the infant is relaxed and the stomach is emptied, either by the act of vomiting on the part of the infant, or emptied by passing a catheter into the stomach. In the earlier cases at the Children's Hospital; roentgenograms were made in most cases but in recent years this has been usually omitted for two reasons: first, because it is unnecessary, and second, that the early postoperative feedings are less apt to be retained. In borderline cases, however, Ladd still sometimes resorts to the roentgen ray and places some reliance on the picture of the blunt, rounded pyloric end of the stomach, as well as on the amount of barium passing out of it.

Ladd states, in conclusion, that the diagnosis of pyloric stenosis is usually easily made; that the treatment should be surgical on all except those with the milder type of the disease; that prolonged or unsuitable medical treatment, before the infant is sent to the hospital, is still in his clinic the most common cause of mortality; that the surgical operation of choice is pyloroplasty because of its resulting low mortality and ease of performance. Mortality from surgical accidents has been almost negligible in his clinic. The decrease in mortality is due to earlier operation and more thorough and careful preoperative and postoperative

care. The cure is permanent. The operation may be classed as one of the most gratifying in the field of surgery.

EUSTERMANN, GEORGE B., and BEUERMANN, WINFRED H., Rochester, Minn. Carcinoma of the stomach. Present status of diagnosis and prognosis. *J. Am. M. Ass.*, Jan. 29, 1927, lxxxviii, 295.

The traditional conception of gastric carcinoma is in need of revision in the light of present knowledge. Progress in our knowledge of the disease has come through clinical and histopathological study of ulcers coming to operation which proved to be carcinomatous, rather than from a study of the primary type in the advanced stage. The causes of delay in the earlier diagnosis and treatment are due to several factors: procrastination, the incomplete examination, failure on the part of the laity as well as of the physician to realize the gravity of dyspepsia having its onset in middle or late adult life, obsolete teaching and textbooks. There may be few symptoms or signs in certain cases, or the lesion may be well advanced before tangible symptoms occur. The symptoms are largely dependent on the site, extent and degree of motor impairment. Diagnostic teamwork makes earlier diagnosis and better prognosis possible. One patient in four has an operable lesion.

Carcinomatous ulcer, usually simulating benign ulcer, is more common than is generally supposed. Every gastric ulcer is potentially a carcinoma. Eight per cent of carcinomatous ulcers occur in patients under forty years of age. Achlorhydria is present in 4.5 per cent of chronic benign gastric ulcers in patients past middle life. The necessity for diagnostic observations and laboratory examinations, or exploratory operations, is in inverse ratio to the skill of the roentgenologist. Roentgenologic criteria of inoperability are more accurate than those of operability.

Intrinsic gastric lesions that simulate carcinoma are gastric syphilis, lymphosarcoma and benign tumor. Extrinsic lesions are carcinoma of the pancreas, carcinoma of the duodenum, and advanced disease of the gall bladder, or carcinoma of that organ. Of various constitutional diseases that may have symptoms like those of carcinoma, pernicious anemia is the most important. Important advances have been made in the preoperative preparation of patients and in anesthesia. Exclusive

of direct extension or metastasis to other organs or tissues, the most unfavorable index to prognosis in general is perigastric lymphatic involvement. Fifty-two and five-tenths per cent of patients without lymphatic involvement were well and free from recurrence three years after operation. In the group with lymphatic involvement, the percentage was reduced to 18.

HARTMEN, HANS, and DOCK, WILLIAM, San Francisco. The use of cholin in paralytic ileus. *J. Lab. & Clin. Med.*, Feb., 1927, xii, 430.

Cholin is normally present in the muscularis of the stomach, and the large and small bowels. It diffuses out of fresh strips of gut and the fluid thus obtained reestablishes contraction in old intestinal strips from which the cholin has disappeared. While cholin is not absent in the gut in cases of ileus, the intravenous administration causes a return of normal peristalsis in experimental ileus due to infection, prolonged anesthesia, or trauma.

The authors had an opportunity to use this drug in but a single case of ileus, but the immediate result was striking.

The use of cholin intravenously in paralytic ileus is justified on both a clinical and experimental basis. The action, both therapeutic and toxic is very fleeting; the rate of administration should be controlled by following the blood pressure. One-half to 1 gm. can be given in fifteen to thirty minutes and repeated if necessary at two to three hour intervals. The cholin should be kept in sealed ampules containing the approximate dose either in crystals or solution as the decomposition products are quite toxic.

COATES, VINCENT, Bath, and GROVES, ERNEST W. HEY, Bristol. Exploratory laparotomy and appendicectomy in chronic amebic dysentery. *Brit. J. Surg.*, Jan., 1927, xiv, 518.

The possibility of a specifically infected gall bladder or appendix acting as a release station for amebae should be considered in cases of amebic dysentery not yielding to medical treatment. There is evidence that, in certain picked cases of this type, removal of such incubation centers has mitigated the course of the disease. Laparotomy is the operation of choice, and the surgeon should be given a free hand to perform cholecystostomy,

appendicostomy, or colostomy in addition to appendectomy as occasion seems to warrant.

Three cases are reported.

SEELIG, M. G., St. Louis. Fundamental principles underlying the operative cure of inguinal hernia. *J. Am. M. Ass.*, Feb. 19, 1927, lxxxviii, 529.

In children and in muscular young adults, with oblique hernias having a narrow-necked sac, one may feel a distinct sense of assurance if he has merely accomplished a high ligation of the sac. He should always, however, in addition to this, suture the outer flap of the external oblique muscle to Poupart's ligament. If the edges of the transversalis fascia are available, added assurance will attend this approximation. If the hernia is larger or if it is of the direct variety, high ligation of the sac alone is not by any means a reliable guarantee against recurrence. Here the fascia transversalis should be diligently sought for. If found, and the defect in it securely closed, the major part of the cure has been accomplished. If it is not found, then, by the use of McArthur's technique, the conjoined tendon (when present) or the lower portion of the rectus sheath and the red muscles are sutured to Poupart's ligament with a fascial strip. Under all circumstances, the inner flap of the external oblique is next sutured to Poupart's ligament with chromic gut, and the outer flap of the external oblique, when possible, is imbricated over this suture. The cord is transplanted in all cases. Sometimes it is not possible to imbricate the outer flap of the external oblique. Under such circumstances this suture is dispensed with, the skin and subcutaneous suture being closed over the cord.

If the hernia is unmanageably large or has recurred several times, it will be necessary to adopt the Gallie technique and weave the defect in the abdominal wall with numerous fascia lata strips.

GIBSON, THOMAS E., San Francisco. The diagnosis of adrenal tumors. *Calif. & West. Med.*, Feb., 1927, xxvi, 201.

A differential diagnosis of adrenal tumors from other growths, as well as between cortical and medullary tumors of the gland itself, can be made as a rule by their clinical manifestations. The added information gained by a

urological investigation is often of decided value.

Adrenal tumors give rise to three distinct syndromes: (1) the genitosuprarenal; (2) the Hutchison; and (3) the Pepper.

The genitosuprarenal syndrome occurs only in cortical tumors (carcinoma, hyperplasia, adenoma) and is characterized in the female by virilism of pseudohermaphroditism, and in the male by precocious puberty. The sexual changes produced are always in the direction of the adult male type, irrespective of sex. The adult male shows no characteristic sexual alterations. Cortical tumors occur as frequently in infancy and childhood as in the adult.

Hypertension is frequently associated with cortical tumors.

Pigmentation occurs rarely in cortical tumors and never in medullary tumors.

The common tumor of the adrenal medulla is the neurocytoma, or "sarcoma." Medullary tumors are about as frequent in occurrence as cortical tumors. They are peculiar to infancy and childhood. Two types occur: (1) the Hutchison, characterized by early metastasis to the orbit producing unilateral exophthalmos, and (2) the Pepper, characterized by rapid abdominal enlargement due to metastasis to the liver. The primary growth generally remains small and may be discovered only at autopsy.

The prognosis in adrenal tumors is almost uniformly bad. Occasional cures are reported in cases of cortical tumors.

The treatment is surgical and roentgenological. A preliminary urological investigation is essential not only as a diagnostic measure, but to determine relative renal function, since it is often necessary to remove the kidney with the tumor mass.

BURFORD, C. E., St. Louis. Nephropexy for the relief of ureteral kinks associated with ptosis. *J. Am. M. Ass.*, Feb. 19, 1927, lxxxviii, 541.

The author draws the following conclusions:

1. Nephropexy is the only relief for the majority of ptosed kidneys causing ureteral kinks.

2. It is a safe operation, as the mortality is from 0 to 2 per cent.

3. Routine pyelograms and ureterograms in horizontal and upright postures are necessary to visualize the condition and make accurate diagnosis.

4. General ptosis of the abdominal viscera, kidney and ureteral stones are not contraindications for the operation.

5. Persistent infections in the ptosed kidney are frequently cured by a nephropexy which will keep the ureter straight enough to drain its contents.

SCHOLL, A. J., Los Angeles. Histology and mortality in tumors of the prostate, bladder, and kidney. *Calif. & West. Med.*, Feb., 1927, xxvi, 185.

The postoperative data in a series of cases of tumor of the prostate, bladder, and kidney were correlated with the histologic structure in an endeavor to establish an index of malignancy.

There are two types of prostatic carcinoma: the first type, which has a lower degree of malignancy than the second, corresponds closely to the normal or glandular structure of the prostate. The second type is made up of irregular masses of cells with no attempt at differentiation.

The common epithelial tumors of the bladder are also divided into two primary groups: the malignant papilloma and the solid carcinoma. The first group, which is made up of tumors retaining to a considerable extent the characteristics of the bladder mucosa and the benign papilloma, is of a much less degree of malignancy than the solid carcinoma group.

Tumors of the kidney are divided primarily into the papillary adenocarcinoma and the alveolar carcinoma groups. The papillary adenocarcinomas correspond to the so-called hypernephroma group and are of several different types with corresponding degrees of malignancy. The alveolar carcinoma group is a small one; the tumor, which is highly malignant, tends to reproduce the tubules of the adult kidney.

The difficulty or ease of surgical removal of tumors must be considered a most important factor in regard to prognosis regardless of the inherent malignancy of any tumor.

PRATT, J. P., Detroit. Adenomyoma or endometrial implants in the abdominal wall. *J. Mich. State M. Soc.*, Feb., 1927, xxvi, 82.

Implantation of endometrial tissue in a laparotomy scar is not uncommon. Forty-two cases are reviewed and four new cases added. It follows, more frequently, an operation in which normal endometrium has been trau-

matized. Ventral fixation is the most common type of operation preceding scar implantation. Special care should be used during this operation not to penetrate the endometrium. Although the growth in the scar was not encapsulated local excision was sufficient. Two cases of incomplete removal recurred. A second operation relieved both of these. All local symptoms have been relieved by removal of the growth. Regardless of the cause of other endometrial growths this group seems to be due to implantation.

COLLINS, CLIFFORD U., Peoria, Ill. Adenomyomas of the rectovaginal septum. *Illinois M. J.*, Feb., 1927, li, 128.

Sampson's theory that these tumors are caused by the escape of endometrial cells through a patent fallopian tube is being generally accepted by pathologists and gynecologists.

These tumors are found only in women during the menstrual period of their lives, and the majority of the patients have not been pregnant or several years have elapsed since the birth of a child. Graves reported three cases of adenomyoma in the rectovaginal septum in which he removed the uterus with the ovaries, but did nothing to the tumor, which completely disappeared in two cases and had practically disappeared in the third case. As more cases have been reported it is generally conceded now that the complete removal of the ovaries will cause the tumors to cease to grow and will probably cause them to disappear. It would simplify the operative procedure very much if it was necessary only to remove the ovaries and leave the tumor alone, because it is very difficult to remove the tumor completely.

No examination of a tumor in the rectovaginal septum is complete unless the examining finger is passed into the rectum.

In the removal of these tumors a great deal of attention must be paid to hemostasis as these patients have a tendency to bleed freely during and after the operation.

If an accidental or deliberate opening is made in the rectum, the drainage material should not be gauze or stiff rubber, but soft rubber dam, and the rubber dam should not be placed on the suture line.

A great many more cases must be reported before definite conclusions can be made as to the proper treatment. Until definite conclusions



can be formed the treatment of each patient must be determined by the judgment of the surgeon.

Collins reports five cases.

MILES, LEE MONROE, Saint Paul. Endometrioma involving the rectum. *Minnesota Med.*, Feb., 1927, x, 88.

These two interesting cases are additional evidence of the effect of oophorectomy on endometriomatous tumors. It apparently makes little difference whether the interruption of ovarian function is secured by surgical removal or by radium inactivation.

Recurrence of symptoms is cited in two of the cases previously quoted, due without doubt to the fact that one or both ovaries had been left in place after removal of the adenomyomatous uterus. Recurrence of symptoms occurred in one of Miles' cases. The best treatment is to remove both ovaries at the time of the original operation if it is possible, but with the well-known effectiveness of radium on the ovaries good results may be obtained in those cases in which it is impossible or unwise to remove the ovaries. Extensive resections of the bowel can be avoided in most cases if the nature of the growth is recognized and the ovaries are removed or radiated.

Miles draws the conclusion that in dealing with adenomyomas that have penetrated beyond the uterine tissue and in ectopic endometriomas with numerous adhesions to adjacent organs in which it is impossible or inadvisable to remove the entire new growth, the removal of all ovarian tissue is the *sine qua non* of successful treatment.

WILLIAMS, PHILIP F., Philadelphia. Is the sedimentation test of practical value in gynecology? *Am. J. Obst. & Gynec.*, February, 1927, xiii, 228.

Contrary to many, Williams concludes that the sedimentation test, while simple and easy to carry out, has not seemed to be consistent in expressing the reaction of the body to the disease process or to the nature of the pathology as found at operation. A rapid sedimentation time has not been found to presage any unusual degree of postoperative morbidity. In comparison with this test the temperature curve and the study of the leucocytes remain as more stable and reliable indices for diagnosis and prognosis.

AVERETT, LEONARD, Philadelphia. Nonspecific protein therapy in gynecology. *Am. J. Obst. & Gynec.*, February, 1927, xiii, 238.

Nonspecific proteins have a definite and valuable place as therapeutic agents in the treatment of gynecologic infections. Their judicious use will replace surgical intervention in some cases and will thereby not deprive women of the sex organs, and enable them to continue menstrual and reproductive functions.

Following the use of nonspecific proteins there develops a leucopenia, with a decrease in the polymorphonuclear leucocytes and a relative lymphocytosis. This, therefore, supports the theory that the beneficial effect derived from this method of treatment is an increased lymphogenesis and lymph flow to the region of infection.

A febrile reaction with its train of disagreeable symptoms is not considered essential in the successful use of nonspecific protein therapy as was heretofore thought necessary. A fat-free milk of low bacterial count will give good results without a reaction and with very little discomfort to the patient.

In my experience, the use of this therapeutic agent yields the best results in the acute and subacute pelvic infections; i.e., before dense adhesions have had time to develop.

The immediate effect of the injection of nonspecific proteins is the disappearance of pain and the development of a sense of well-being.

KENNEDY, JOHN P., Charlotte. Burns and their treatment. *South. Med. & Surg.*, Feb., 1927, lxxxix, 84.

In the early stage of extensive burns, it is helpful to recognize a stage of shock and a stage of toxemia. Prevention or treatment of shock resolves itself around the relief of pain and the prevention of the loss of fluids and loss of body heat. One per cent novocaine packs in normal salt solution locally with a large amount of water by mouth and conservation of heat under an electric cabinet have proven efficacious in the stage of shock.

Toxemia is due to the absorption of toxic protein products resulting from the action of heat on normal skin, and absorption may be prevented by the addition of adrenalin chloride to the wet packs or by débridement of burned skin or by treatment with tannic acid.

Exsanguination-transfusion may save some



apparently hopeless cases with toxemia and convulsions.

Granulating burns may be treated to advantage with mercurochrome and paraffin dressing. This treatment rapidly clears up infection, keeps down excessive granulations and promotes rapid epithelization.

Areas to be skin grafted may be prepared by a three-day treatment with paraffin which gives a smooth flat surface to which grafts readily adhere.

HEMPELMANN, THEODORE C., St. Louis. Cerebral birth paralysis. Factors which influence prognosis and treatment. *Am. J. Dis. Child.*, Feb., 1927, xxxiii, 296.

Two hundred and thirty-eight children with spastic paralysis were examined in consultation with a neurologist and orthopedist and the following symptoms, in the order of their importance, were found to indicate a relatively bad prognosis: (a) mental deficiency, (b) progression of the disease, (c) athetosis and (d) ataxia.

The most successful treatment was found to be peripheral neurectomy of the nerves of supply to the spastic muscles, followed by carefully supervised training which aims at restoring the proper balance between the opposed muscle groups.

SMITH, MILLARD, Boston. The use and action of o-iodoxy benzoic acid in the treatment of arthritis. *Boston M. & S. J.*, Feb. 24, 1927, cxcvi, 305.

O-iodoxy benzoic acid was introduced by Young and Youmans of the University of Michigan in the treatment of arthritis. In structure it is similar to the salicylates except that it contains iodine and readily available oxygen. Its action is similar to that of the salicylates but it is many times more effective. When first introduced, intravenous injections were used, but it has also been found to be effective orally. When given intravenously it produces a severe constitutional reaction while administration by mouth is attended with practically no discomfort. It is analgesic, relieves muscle spasm, and reduces edema. The presence of joint pain, muscle spasm or swelling should be an indication for its use. The chronicity of a joint lesion is no contraindication for a trial of the drug. A series of thirty-three patients with different types of arthritis treated with this drug is presented.

MEYERDING, HENRY W., Rochester, Minn. The preoperative differential diagnosis of bone tumors. *J. Am. M. Ass.*, Feb. 5, 1927, lxxxviii, 365.

Meyerding presents a classification of bone tumors in which they progress from the traumatic and infectious through the benign to the most malignant types. It consists of ten groups: 1. Inflammatory lesions simulating bone tumors (osteoperiostitis): traumatic (callos, ossifying hematoma); syphilitic; infectious (non-suppurative osteitis of Garre, Brodie's abscess, tuberculosis). 2. Osteitis fibrosa cystica; cysts. 3. Benign osteogenic tumors: exostosis; osteoma; chondroma; fibroma. 4. Giant-cell tumors. 5. Angioma. 6. Endothelioma (Ewing's tumor). 7. Periosteal fibrosarcoma. 8. Osteogenic sarcoma. 9. Multiple myeloma. 10. Metastatic tumors.

Meyerding asserts that with a history, clinical examination, urinalysis, Wassermann test and roentgenogram, an expert may accurately diagnose 9 out of 10 cases. There exists a small group, however, which defies even the most experienced until the tumor is explored and the macroscopic and microscopic character is determined; doubtless, rare examples occur in which the malignant growth is unsuspected until metastasis is evident. The roentgenogram properly made and interpreted is one of the most valuable, if not actually the most valuable aid in diagnosis, and will alone insure the diagnosis of the majority of bone lesions. Illustrative cases are cited. In discussing the preoperative differential diagnosis, the physician, roentgenologist and surgeon should cooperate. When differences of opinion exist as to diagnosis, the value of the pathological examination, both macroscopically and microscopically, should not be forgotten, as in these patients the fate of a limb is frequently dependent on them.

WILSON, JOHN C., Los Angeles. Dislocations of the outer end of the clavicle. (Discussion.) *Calif. & West. Med.*, Jan., 1927, xxvi, 39.

Dislocation of the acromioclavicular joint, if not reduced, is a disabling condition. Fixation with an absorbable ligature and arthrodesis of the acromioclavicular joint has been common practice with an end-result of questionable value. Since the cause is a rupture of the ligamentous structures binding the clavicle to

the coracoid process of the scapula, the cure must lie in their repair or reconstruction.

Wilson has reconstructed the coracoclavicular ligament by passing a free fascia lata transplant through the distal end of the clavicle and the coracoid process, pulling it taut and securing it in position with sutures. A stable joint has been the result in four cases. The period of convalescence is comparatively short, averaging about ten to twelve weeks.

FUNSTON, ROBERT V., Detroit. The treatment of fractures of the os calcis. *J. Mich. State M. Soc.*, Feb., 1927, xxvi, 102.

The important causes of latent disability in fractures of the os calcis are:

i. Irrigation of the calcaneocuboid and calcaneo-astragaloid joints by displaced fragments.

ii. Lateral displacement of the fragments causing impingement on tissues and interference with tendon motion.

iii. Flat foot and knock ankle deformity causing improper weight bearing.

iv. Loss of the normal length of the os calcis by impaction.

To obtain roentgenograms that will clear these points, plates must be taken in three directions: (a) anterior-posterior, (b) lateral and (c) through the os calcis from the rear at a 45° angle.

A technique has gradually been developed by Funston and Hall for all fractures of the os calcis with displacement. It consists in:

1. Allowing the patient to rest four to eight days until the swelling begins to subside, then careful preparation of the skin.

2. Open lengthening of the tendo Achillis by the sliding method. This is used as a means of avoiding the more dangerous subcutaneous tenotomy.

3. Breaking-up of impaction and reduction of displacement of the posterior fragments by use of the No. 24 urethral sound passed over the os calcis through small incisions in the skin (Cotton's method). To obtain sufficient leverage the patient is turned on his stomach and the toes allowed to reach just over the edge of the table. Counterpressure in the arch is obtained with a padded wooden board wrapped in sterile dressings and sustained against the surgeon's chest.

4. The inner side of the foot is placed against a sand bag and the fragments under the outer

malleolus impacted with a mallet and rolled bandage (Cotton).

5. When the restoration seems complete a cast is carefully applied with the foot in slight inversion at a 90° angle. The rolled bandage is left carefully in place under and behind the external malleolus to prevent any recurrence of the displacement of the lateral fragments. The cast is undisturbed for four weeks when the anterior half is removed. At six weeks the feet are removed from the cast only for daily motion and heat. At eight weeks the casts are entirely removed and two weeks later weight bearing is begun in specially prepared shoes. A small outside upright of steel with an inside T-strap prevents lateral strain while a high arch support of felt prevents strain on the os calcis itself.

GHORMLEY, RALPH K., Boston. Heliotherapy in relation to the treatment of tuberculosis of the spine in children. *J. Am. M. Ass.*, Jan. 29, 1927, lxxxviii, 289.

Ghormley records his observations of 63 cases of tuberculosis of the spine at the New England Peabody Home for Crippled Children in Newton Center, Mass. Of the 63 patients, for the most part children under ten years of age, all but 4 had the onset of the disease before the age of six years, and in 43 of the remaining 59 cases, the disease began before three years of age.

The value of the weight chart as a guide to treatment is emphasized. The climate of New England and particularly that part around Boston is at times not mild. The yearly average percentage of possible sunshine is 57. During the months of November, December and January, about 48 per cent of possible hours of sunshine are available. From June through September, there is about 63 per cent. There is a definite tendency toward a general loss in weight during the winter months, while during the summer months a marked rise occurs.

Artificial light of the mercury vapor quartz type is now used as a substitute for sunlight on cloudy and cold days. So far, experience has not shown any striking results from this form of therapy. It seems to have a definite tonic effect in some cases and produces a distinct pigmentation. Calcification, both in the spine and in the abscesses not drained, represents a more striking change than is seen in cases treated without heliotherapy. Whether there

is a specific action of the sunlight toward this in tuberculosis has not been proved.

In a case cited, the roentgen-ray examination showed calcification throughout the lesion and gradual diminution in the size of the psoas abscess with calcification. At autopsy the spine and psoas abscess were removed. These have been sectioned and thoroughly studied. Nowhere, either in the spine or in the walls of the abscess, is there any evidence of active tuberculosis. There is healing by fibrosis, and the marrow spaces of the involved vertebrae show only the normal cellular constituents of vertebrae in a child of that age. The contents of the calcified abscess were not hard but were of the consistency and appearance of wet chalk. The spine on gross examination was firm and solidly fused over the diseased area. Ghormley feels that this case furnishes definite proof that the disease in the spine may be healed by heliotherapy.

Success in improving deformity depends on the localization and particularly the extent and duration of the disease, and early diagnosis followed by adequate treatment under constant observation will result in healing with slight, if any, deformity. Though the advantages of heliotherapy are well known, the calcification in the lesion and in the abscesses is an important change, and the altered reaction of the tissues through allergy may be better sustained under heliotherapy and thus healing favored.

SONNENSCHN, H. D., New York. A modification of the Steinmann nail. *J. Am. M. Ass.*, Jan. 22, 1927, lxxxviii, 243.

The chief annoyance in using the Steinmann nail is that the nail sticks into the mallet at the end of the blow, and at the close of the operation the mallet is badly mutilated, and many times the nail also. If, as is a common practice, a flat instrument is held between the nail point and the mallet, this instrument is dented and scratched, and does not protect the end of the nail from damage.

To the usual type of nail, a "shoulder" is braised at one end; this shoulder is so placed that it does not interfere with the skin wound or with the traction pieces. A sheath of steel tubing is fashioned over this end, long enough to fit against the shoulder and to clear the end of the nail. The blows of the mallet are directed against the flat end of this sheath, and after

the nail is in position the tubing is removed. The shoulder is of aid in withdrawing the nail, as it can more easily be grasped with a pair of forceps.

## SUPPLEMENTARY ABSTRACTS OF ROENTGENOGRAPHY AND RADIUM THERAPY

DRUECK, CHARLES J. Operability of cancer of the rectum. *Illinois M. J.*, August, 1926, l, 155-157.

Rectal carcinoma remains localized for long and this fact would make its radical removal a very hopeful undertaking if the growth can be discovered early. A thorough roentgen examination is indispensable. Such an examination made by an expert presents very definitely and distinctly the filling defects by a barium mixture. The examination should be roentgenoscopic, and films should also be taken in order to determine accurately the condition and location of the lesion. By such a carefully interpreted roentgen examination, very few cancers of the pelvic bowel can escape diagnosis, while at the same time undue importance will not be given trivial deviations from the normal.

The pelvic bowel may be examined after a barium meal by mouth or with the aid of an opaque enema. The clyster is the more frequently used and in the study of obstruction of the bowel the clinician will gain valuable evidence while watching the inflowing enema. The patient lies on his back on the screen table and the opaque mixture is allowed to fill the rectal ampulla. The sigmoid flexure and the rest of the colon fill irregularly; and at this time palpatory manipulation is employed.

There are wide variations in what must be considered pictures of the normal terminal gut, i.e., where junction is normal and there is no visible lesion in the rectum. The descending colon usually varies somewhat at the sigmoid flexure and expands again at the ampulla, then tapers towards the anus. The most important sign on the roentgenogram of the pelvic bowel is the filling in of defects in the contour of the bowel. This change from the normal outline may be due to spasm of the colon, to feces, intestinal gas, adhesions or extrinsic pressure on the intestine or tumor growth. In cancer, this irregularity may be sharply outlined or definitely shaded.

In the colon, obstruction other than cancerous is very rare. The filling defect shows the proximal limits of the disease. This deformity of the outline of the intestine may show a concentric narrowing of the lumen or it may be limited to one side. After a tumor has been

located, it has to be differentiated from diverticulitis, tuberculosis, actinomycosis, syphilis, and benign tumors within the colon. Spastic contractures of the sigmoid colon show as small irregular haustra. Five cases are briefly cited.

EDITORIAL. Cholecystography. *Lancet*, July 3, 1926, ii, 25-26.

One of the finest examples of fruitful results proceeding from academic medical research is the evolution of tests for the function of the kidneys and liver which was led up to by the investigation of the pharmacology of phenolphthalein compounds. The sulphone derivative of phenolphthalein is excreted almost solely by the kidneys while the halogen compounds are excreted partly by the kidney but to a greater extent by the liver. Considering the fact that Graham's preliminary report was published only in 1924, a very considerable amount of knowledge has been collected on the subject of cholecystography, and the method although not yet standardized has become definitely established in clinical medicine.

There is no doubt that the intravenous method of administration of the dye gives better shadows and is on the whole more reliable than the oral method, but as regards safety for the patient the method of oral administration is less hazardous. The dose which can be administered by mouth is no greater than that by the veins, for if it is increased, vomiting is produced and the test is spoiled. There appear to be but few failures when the cholecystographic test is properly carried out. Even allowing for the enthusiasm for a new and ingenious procedure, the results of cholecystography reported from all quarters show such a degree of reliability that the method is certain to obtain a permanent place in diagnosis.

EISENDRATH, DANIEL N. The diagnosis and treatment of bladder tumors. *Illinois M. J.*, September, 1926, I, 205-210.

For practical purposes it is important to remember that about 90 per cent of all bladder tumors belong to the epithelial type. The remaining 10 per cent include benign neoplasms like fibromyoma, angioma, adenoma, and more malignant ones such as sarcoma, sarcomatoma, etc. About 40 to 50 per cent of the epithelial bladder tumors are simple papillomas. Bladder tumors present one or a combination of the following predominant symptoms: (1) hematuria; (2) symptoms like those of an acute or chronic cystitis; and (3) symptoms of bladder neck obstruction.

For clinical purposes of therapy, cases may be divided into: (1) those showing prospect

of cure; (2) those in which cure is questionable, and (3) those in which it is hopeless, and where therapy can be only palliative. The tumors in Group 1 include the benign papilloma whether pedunculated or sessile. This can be handled effectively by fulguration with or without radon implants. About 35 per cent will recur after endovesical treatment, but even these can usually be cured by further treatment. In other cases, surgical diathermy through a suprapubic cystotomy incision is found effective. Diathermy gives promise of far more permanent cures in both benign and malignant papillomas than does either radium or resection.

The cases in the second group include those of recurrent papilloma in which fulguration or radium treatment is of no avail, and also cases of papillomas which appear to be malignant from the outset. Clinicians are still groping in the dark as regards the treatment of such cases. Some prefer radium alone, others believe in resection of the tumor, while still others employ a combination of these two methods in conjunction with deep roentgen therapy and diathermy. The statistics from the various clinics are not very encouraging. The author has found that surgical diathermy applied through a suprapubic incision has thus far given the most satisfactory results in medium and large benign, as well as malignant papillomas.

The therapeutic means which can give relief to the incurable cases are deep roentgen therapy, endo- or transvesical insertion of radium, ureterostomy or nephrostomy and reimplantation of the ureters into the rectum.

FARR, CHARLES E. Dislocation of the carpal semilunar bone. *Ann. Surg.*, July, 1926, lxxxiv, 112-115.

During the past seven years about 20 cases of dislocation of the carpal semilunar have been observed, 12 of which were treated by closed reduction or excision of the bone. One case was seen on the day of accident and the dislocation was reduced with great ease and gave an excellent result. Late reduction or excision may give good but not perfect function. About 10 per cent of stiffness and weakness of the wrist will usually occur in late cases.

Without the use of roentgenograms only a good guess may be made, but the presence of a painful, weak, swollen wrist with a special swelling on the anterior surface and rather marked limitation in flexion with local tenderness are quite suggestive of the lesion. In the present series the correct diagnosis was made on several occasions before confirmation by the roentgenogram.

It seems reasonable to believe that most of these dislocations really start as dislocations of the os magnum backward. As the force is continued the os magnum drives the semilunar from its pocket in the carpus and itself resumes a more normal position in the wrist. This was noted repeatedly on partially successful reductions of a dislocated semilunar. The bone reaches nearly a normal position in the carpus except for its relations with the os magnum. Three cases are briefly cited.

FRIEDRICH, H. The weakly concentrating gall-bladder in relation to cholecystography. *Deutsche Ztschr. f. Chir.*, 1926, cxcviii, 1-10.

In 27 out of 100 cases, it was not possible to obtain a gall-bladder shadow on otherwise good roentgenograms. The author employed the sodium salt of tetraiodophenolphthalein which was injected intravenously in 3-4 gm. quantities. Twenty-two of these cases were operated on and the gall-bladder was found diseased every time (histologically confirmed). Of the remaining 5 cases, 4 refused operation and the fifth was not advised operation because gall-bladder disease was not suspected. In 8 of the operated cases (4 with gallstones) none exhibited any obstruction, and there was no demonstrable hindrance to the outflow of the bile from the gall-bladder.

The color of the gall-bladder bile in roentgenologically non-demonstrated gall-bladders differed from that in the visible gall-bladder. In the visible gall-bladder the bile was dark to deep black, while in the non-visible gall-bladder it was always lighter colored (mahogany brown or olive green) if not containing whitish mucus. The latter suggests that either the liver secretes another kind of bile, or else more probably, that the bile in the gall-bladder is not concentrated in the usual manner. A determination of the bilirubin content may be used as a measure of the concentrating power of the gall-bladder.

In a series of exploratory laparotomies, the bile was removed through a fine needle from apparently healthy gall-bladders and the color in all cases was deep black with very high bilirubin values.

In the 8 cases above mentioned showing no cystic obstruction the bilirubin content of the bile was very low. This is regarded as clear indication that the gall-bladder mucosa has lost its concentrating power, and this is also the reason why the tetraiodophenolphthalein failed to concentrate sufficiently to a cast a shadow in the roentgenogram. The particularly important point established is that a gall-bladder may show hardly any external changes at operation, may appear perfectly normal, and yet may fail to give a roentgen picture owing to

its inadequate functioning. Two examples are cited.

These observations may perhaps throw light upon certain obscure gall-bladder diseases.

These are the atypical conditions described under such various names as pericholecystitis, periduodenitis, gall-bladder inflammation without stone, and mechanical cholecystitis. This is a field in which cholecystography may very well contribute important results. In the absence of cholecystography, puncture of the gall-bladder and examination of the bile will disclose the existence of a poorly concentrating gall-bladder. Such a finding would justify the removal of the gall-bladder. It still remains to be seen what the end effects will be in cases where such a gall-bladder has been removed.

GRAUHAN, MAX. The diagnosis of cystic kidney. *Deutsche Ztschr. f. Chir.*, 1926, cxcvii, 205-231.

A functional test of the cystic kidney is indispensable in determining the stage of the disease and in establishing the prognosis in the individual case. The functional test is, however, not sufficient to establish the diagnosis where the palpatory findings are indefinite, because the results in early cases of polycystic degeneration deviate only slightly from the normal. The combined clinical, functional and roentgenological examination of cystic kidney permits a fairly accurate understanding of the condition and functional activity of both kidneys before operation. This has the advantage that a choice of suitable treatment can be made judiciously. There is no longer any need for a quick decision such as is necessary at the time of operation.

The age of forty to sixty years appears to be the most dangerous for those affected with cystic kidneys. Experience shows that the greatest danger is not from hemorrhage and infection but from uremia. Pyelography and pneumography are very important procedures in diagnosis. It appears that German authors have not fully appreciated the advantages of pyelography in the diagnosis of cystic kidney. Pathognomonic pictures by pyelography can be expected only if the calyx undergoes characteristic change during cystic degeneration. This is not yet certain for those cases in which the degenerative process is only recent.

HERRICK, FREDERICK C. Pyelography in the diagnosis of tumors of the flank. *Ann. Surg.*, May, 1926, lxxxiii, 634-650.

Tumor masses occurring in the flank, i.e., that area bounded by the ribs, iliac crest and linea semilunaris, often present many difficulties of diagnosis. The history, clinical signs

and results of general and local physical examination may be inconclusive, and the urologist may be sought for special evidence.

In such cases the author has made use of the device of placing a coin on the surface over the tumor and then making a pyelographic examination. This has enabled the differentiation of intraperitoneal from retroperitoneal masses (perirenal, subrenal and renal); (2) extrarenal (retroperitoneal) from intrarenal masses; and (3) intrarenal masses.

In making these differentiations use has been made of six factors as observed in the roentgenogram: (1) the position of the kidney; the normal being with its pelvis opposite the first or second lumbar intervertebral space. Variation from this must be explained by hypermobility due to one of the known causes, or displacement by tumor masses or drawing as by inflammatory processes. (2) Disturbances of the normal longitudinal renal axis. The normal direction is obliquely toward the spine cephalad, at an angle of  $15^{\circ}$ . (3) Disturbance of the normal anteroposterior axis or rotation of the kidney on its vessels as an axis. (4) Distortion of one or more calyces of the pelvis; typically seen as when caused by pressure on the kidney from an extrarenal mass. The entire pelvis and calyces are present but elongated or distorted by pressure. (5) Absence of a part or all of one or more calyces. This, in the author's experience, has been brought about most commonly by intrarenal masses, abscess or tumor, by which a calyx has been distorted or obliterated by pressure so that the contrast solution does not enter it. (6) Fragmentation of the pelvis or calyces which constitutes a typical picture of tumor close to the true renal pelvis.

Tumor outside the kidney is more likely to change the renal axis and distort the pelvis or calyces; while tumor within the kidney is more likely to obliterate or fragment the calyces. Twelve illustrative cases are cited and pictured.

HIGGINS, C. C. Chronic duodenal ileus. *Arch. Surg.*, July, 1926, xiii, 1-42.

Chronic duodenal ileus is not a rare condition and there are undoubtedly many cases that have not been diagnosed. Because of the severe headache associated with this condition a diagnosis of migraine is usually made. In all cases of severe headache associated with vomiting, a careful examination of the duodenum should always be made. Sometimes an accurate diagnosis is not made until the duodenum is exposed during an exploratory operation. Even the roentgenogram may not clearly define the condition.

The history and physical findings are important, as has been shown by the fact that in a few of the author's cases a correct diagnosis was made before the roentgen examination. However roentgenographic and roentgenoscopic examinations are of considerable value in many cases. Sometimes evidences of antiperistalsis, regurgitation of the barium meal into the stomach or of duodenal stasis may be secured roentgenoscopically while only a questionable roentgenogram is obtained. It should be realized that a pathologic condition may be present in the duodenum even if the duodenal cap fills perfectly. To eliminate duodenal stasis the duodenum should be observed at intervals for a period of from twenty to forty-five minutes. In many instances an enteroptosis or gastropnoxis renders visualization of the third portion of the duodenum difficult, and a lateral view must be taken to secure a good picture.

Obstruction of the second portion is more readily visualized as the dilatation is frequently above the transverse colon and can be seen to the right of the stomach. Delay in the passage of barium through the duodenum is suggestive especially if the duodenum is constantly visible. Hayes' technique for visualization of the duodenum should be used in suspected cases. Of course in all cases of acute dilatation of the stomach the condition should be suspected, and an attempt should be made to see whether change of posture will relieve the symptoms.

In cases in which the dilatation is insufficient to produce duodenal stasis and is associated with gastropnoxis, an effort should be made to secure relief by non-operative measures. If the dilatation is marked and stasis with antiperistalsis is present, a duodenojejunostomy should be performed with the expectation of satisfactory results. Resection of the right colon is indicated in a few cases and should be performed only as a last resort. Gastroenterostomy should not be performed as the stasis in the duodenum is not relieved, and a vicious circle is established.

The author gives case reports of 57 patients, 31 of whom received medical treatment, 3 medical and surgical, and 20 surgical. The 3 remaining cases were diagnosed only.

HUBENY, M. J. The X-ray in appendicitis. *Illinois M. J.*, September, 1926, I, 235-236.

Because the appendix may have a physiological function, it should be studied roentgenologically before removal in suspected chronic cases. Because it possesses peristalsis, an appendix showing in the roentgenogram either retention or rapid expulsion of the barium



is of diagnostic value. Because of its reflex influence over the alimentary tract, the appendix should be investigated by the barium method in many diseases of the stomach and intestines. The location of the appendix can be determined approximately even when not visible on the plate or screen because of the anatomical relation to the cecum. When barium-filled, the appendix can be studied roentgenoscopically in great detail and accurately palpated for pressure pain and adhesions. The time of examination is important, for the appendix commences to fill shortly after the cecum.

MADLENER, MAX. Tuberculosis of the os pubis. *Deutsche Ztschr. f. Chir.*, 1926, cxvii, 329-335.

Tuberculosis of the os pubis is a very rare condition and the author's experience shows that if there is prolonged fistulation in this region, suspicion of tuberculosis may be entertained, and a pelvic roentgenogram will confirm the diagnosis. This disease has been reported in the literature in 33 cases and the author adds 5 more which have been observed in the past two years.

In the author's cases the local roentgenogram showed in the region of the fistula a washed out appearance of the bony structure, (rarefied), the vicinity of the foci showed no sclerosing processes but rather partial atrophy, and the periosteum disclosed no stratification. Other manifest tuberculous foci in addition to the involved os pubis were found 3 times.

The treatment consisted of strict rest in bed and nourishing diet, local roentgen irradiations and sun baths of the whole body. Some of the cases required operative treatment. The question as to whether conservative treatment will suffice or not depends on the nature of the individual case. The prognosis so far as the local condition is concerned is favorable.

MARIETTA, S. U. Abscess of the lung. *Am. Rev. Tuberc.*, August, 1926, xiv, 107-134.

The diagnosis of abscess of the lung is one of elimination. The history is of great importance. Any failure of resolution or clearing up of the pulmonary tissue following an infectious disease therein (lobar pneumonia, bronchopneumonia, influenza, etc.), symptoms indicating localized pulmonary involvement after a general anesthetic especially when given for operative procedures on the upper respiratory tract, or the presence of non-suppurative processes elsewhere in the body should always cause one to think of lung abscess.

The roentgen ray is of great value in the diagnosis and it is absolutely necessary for the definite localization of a pulmonary abscess. Thickened pleura, if marked, or a prominent

area of pneumonic reaction about an abscess may vitiate the information to be obtained roentgenographically. The plates should be stereoscopic, and as the definite localization of the condition may be the deciding factor in the method of treatment to be followed, it is advisable to take both anteroposterior and lateral views. It has been stated that the judicious use of sedatives for twenty-four to forty-eight hours preceding roentgen examination is helpful, as there is an accumulation of secretion and thus exaggeration of the signs. The physical signs are not very characteristic, only serving, as a rule, to show the presence of the localized area of involvement in the lung. The use of the bronchoscope had best be left to those special clinics where an expert in its use is present. The diagnosis of lung abscess necessitates a differential diagnosis from bronchiectasis, gangrene, encysted empyema, pulmonary tuberculosis and lung tumors. In all of these the roentgenogram is of great assistance.

The author has observed in the hospital at Fort Sam Houston 15 cases of single and 2 of multiple lung abscess. The etiology in one case was extension from an amebic liver abscess, in 6 lobar pneumonia, in one the abscess followed tonsillectomy, and in one bronchopneumonia; in 8 the etiology was undetermined. The infecting organisms were streptococci in 3 cases, pneumococci in 4 cases, mixed streptococci and staphylococci in 3 and unknown in 7. Only 6 of the cases, all with single abscesses, were chronic, the rest being acute. Of the 17 cases, 7 were cured, 2 improved, one unchanged and 2 remaining in the hospital. There were 5 deaths (including the 2 cases of multiple abscess).

Six of the cases are reported, one or more of the serial roentgenograms being presented in each case as illustrative of certain pathological types or of changes taking place under treatment.

MONARI, AUGUSTO. A post-traumatic cerebral pneumoventricle. *Radiol. med.*, July, 1926, xiii, 492-494.

A boy of ten was injured in an automobile accident and brought as an emergency case to the hospital with signs of concussion of the brain. He presented a fracture of the vault and base of the skull and a large scalp wound. Roentgen examination showed fracture of the temporal and parietal bones, and the presence in the midst of the cerebrum of two transparent zones the form of the cavity of the lateral ventricles, showing that air had entered these ventricles. As to the portal of entry and the route which the air had taken to enter the ventricles, the author concludes that the air



entered through the scalp wound and the fracture of the skull into the subarachnoid spaces and then passed into the fourth ventricle by the foramina of Magendie and Luschka, and finally reached the lateral ventricles through the Sylvian aqueduct, the third ventricle and the foramen of Monro. The case ended favorably and the patient left the hospital at the end of two months completely cured.

NAEGELI, TH. The significance of the roentgen picture in the diagnosis, therapeutic indications and the evaluation of the result in surgical tuberculosis. *Strahlentherapie*, 1926, xxi, 342-352.

This is a general lecture giving an outline of the relation between the pathology and the roentgen findings in surgical tuberculosis, and suggesting the general principles that guide in the treatment of suitable cases.

As regards diagnosis, the most important item is the recognition of the type of tuberculosis present. In the fibrocirrhotic and cavernous forms which from their nature have a healing tendency, the aim should be to support and augment this tendency. The exudative form which is prognostically more unfavorable is, on the other hand, only rarely suitable for surgical treatment. The roentgenogram permits a differential diagnosis of certain lung conditions that may resemble tuberculosis.

An extensive roentgenological experience combined with a knowledge of the pathologic anatomical factors is necessary to enable one to make use of the roentgenological findings in the selection of cases of pulmonary and bone tuberculosis for surgical treatment.

Repeated irradiations of tuberculous tissue may lead to undesirable effects. This, however, is minimized under present conditions of roentgen technique.

NEUSWANGER, C. H. Iodized oil as a pyelographic medium. *Surg., Gynec. & Obst.*, August, 1926, xliii, 169-176.

The iodized oil used was an emulsion of 90 parts of iodipin (40 per cent, Merck) with 10 parts of neutral soap solution. The soap solution was added because it was found that the original solution flowed with some difficulty through small ureteral catheters. The slight decrease in the opacity of the emulsion was found to be negligible.

The iodized oil was used upon a series of laboratory animals as a pyelographic medium giving excellent results and giving no evidence of toxicity or irritation in the urinary tract. When injected into the venous circulation in dogs in large amounts, it was found to cause areas of temporary congestion with hemorrhage

and infiltration of the lung alveoli; but animals observed for a period of two months showed no untoward symptoms. The iodized oil was found to possess no appreciable bactericidal or bacteriostatic action.

In the clinic, very satisfactory ureterographic and pyelographic shadows were obtained when the emulsion of iodized oil was used. This was true in 2 cases when previous pyelograms and ureterograms made after the injection of 12.5 per cent sodium iodide failed to cast a shadow sufficient for diagnosis.

Iodized oil was found to be especially useful in obese patients and even a small injection of 1 to 2 c.c. into the ureter gave a very dense shadow. Ureteral injections were found to be more complete with iodized oil than with sodium iodide in several instances in which a direct comparison was made.

The oil was found to escape readily from the urinary tract and a roentgen examination twelve hours following an injection gave no evidence of residual oil within the renal pelvis or ureter.

The iodized oil was employed with good results in a series of 27 cases in the Department of Surgery, Yale School of Medicine. Some of the patients examined had had marked destruction of renal tissue, but the oil injections were borne without symptoms of irritation or evidence of harmful effects upon the diseased kidney. Five cases are briefly described and illustrated.

NEWELL, QUITMAN U. The use of iodized oil (iodipin) as a diagnostic aid in gynecology. *Am. J. Obst. & Gynec.*, August, 1926, xii, 189-199.

The author, summarizing his personal experience to date, states that iodipin injections will prove of diagnostic value (1) in sterility cases where the tubes are found obstructed, to determine the character and location of the obstruction. It offers the opportunity of deciding definitely whether or not the case is suitable for operation. (2) When several masses are palpable within the pelvis, injection and roentgen study will clearly differentiate the uterus from the other masses. (3) In cases in which the pelvis is blocked by one large mass. By this method, the precise diagnosis can be made as to whether the tumor originates from the ovary or the uterus. (4) In cases in which a foreign body is suspected within or outside the uterine cavity.

Iodipin injections into the uterus prove helpful in differentiating chronic appendicitis from a right sided salpingitis, and a tuberculous salpingitis from common salpingitis, which means that they might possibly enable one to

make a definite diagnosis of a tuberculous tube.

The method is an invaluable aid in indicating the size of the uterus and determining whether the cavity is encroached upon by any masses such as a fibromyoma, a carcinoma of the fundus, etc. Iodipin injections carefully and skillfully done are not likely to be harmful to the patient.

In 38 cases injected in the course of three months the author has not observed a single unfavorable reaction. There was occasion to open the abdomen of 30 of these cases at various intervals from one to fourteen days after the injections, and no irritating effects were seen of the iodized oil on the tissue of the pelvis in cases where it had passed through the tubes. It would seem that the oil is ultimately eliminated. The exact time of the disappearance of the oil from the pelvis has not been ascertained, but it appears certain that the absorption is relatively rapid and is not a matter of months as in the case of injections into the spinal canal.

NICOLSON, WILLIAM P., JR. Gastric carcinoma with report of three cases of apparent cure. *J. Med. Ass. Georgia*, July, 1926, xv, 272-276.

An early and thorough roentgen examination should be made in all cases of suspected gastric malignancy. In cases where there is definite evidence of metastasis or where the general condition of the patient is poor or where roentgen examination shows extensive involvement about the cardiac end, exploratory operation is probably not advisable; but in practically all other cases it is and the sooner performed the better. The mortality from a simple exploration is exceedingly low. Radical resection of the stomach is the operation of choice when possible. In selected cases if operated on early and given postoperative roentgen treatment the chances for cure seem good.

Three cases are reported. The first is a case of a man aged thirty-nine who was operated on in 1912 and is living and well at the present time. The second was in a man aged sixty-two who is now living more than five years after operative removal of a definitely proven adenocarcinoma of the stomach. The third case occurred in a woman aged sixty-two who was operated on for an early carcinoma of the stomach and is living more than three years after operation with no evidence of a recurrence.

PERONA, PIETRO. Anomalies of the ribs and their importance in the roentgen examination of the respiratory tract. *Radiol. med.*, July, 1926, xiii, 465-486.

During the past year Perona has made a systematic search for anomalies of the ribs in

the patients sent to him for examination of the chest for the purpose of determining the importance of some of these anomalies in diagnosis of diseases of the lungs. His statistics cover 1352 subjects in whom a complete roentgen examination was made. He finds that there are certain anomalies in the number of the ribs, cervical or supernumerary ribs, and that these occur in about 10 cases out of 1000, while anomalies of form occur in about 12 out of a thousand. Anomalies in the number of ribs are found in two-thirds of the cases in women, while nine-tenths of the cases of anomaly of form are found in men, and in the majority of cases on the right side. There is no explanation of this difference in any of the theories as to the etiology of these anomalies.

The number of ribs may be increased or decreased; if there is a decrease it is at the expense of the 12th rib which is fused with the 12th dorsal vertebra and transformed into a mere costiform process. No cases of disappearance of the 1st rib have been reported, although it is sometimes found in a rudimentary form. But a supernumerary rib may precede the first or follow the 12th rib. Only two of his cases with a supernumerary first rib showed any clinical symptoms, although they included all the forms of Gruber's classification. These two patients had pain in the region of the apex which he thinks was due to irritation from the floating anterior end of the rib. One of them said that the pain was always worse in the spring when his upper respiratory tract was congested. The end of a floating supernumerary first rib may be projected on the clear apex space and as it moves synchronously with the apex when the patient breathes deeply or coughs it may be taken for a shadow in the apex. A fixed first cervical rib only barely touches the edge of the apical space, and so is not apt to lead to a mistaken diagnosis, but, on the other hand, it is apt to be overlooked altogether, especially on roentgenoscopic examination. A roentgenographic examination should always be made to determine the relation of these supernumerary ribs to the first true rib and to the vertebrae.

Anomalies of form almost always affect the anterior end of the rib and may very readily be mistaken for lung shadows, particularly when they lie near the hilus where it is harder to differentiate shadows. The first rib may be fused with the second, or cartilage or a mere ligament may be substituted for the central part of it, only the vertebral and sternal parts being made up of compact bone. In the latter cases there may be pain, limited to the cartilaginous portion of the rib and generally due to the patient's occupation. The one patient of this type that the author had was

accustomed to carrying heavy loads on his shoulders and when he stopped work the pain disappeared. The most common anomaly of the other ribs is a bifurcation of the anterior end of one rib, accompanied generally by defective development of the adjacent ribs. This anomaly is found chiefly in the 3d, 4th and 5th ribs of the right side.

The various anomalies are illustrated by roentgenograms.

PHILIPS, HERMAN B. Paget's disease. *J. Bone & Joint Surg.*, July, 1926, viii, 643-650.

Paget's disease manifests itself with definite roentgenological characteristics permitting a definite diagnosis whether the disease is local or general. The latter part of this statement would be probably more exact by qualifying it as early or late. General roentgen examinations are advisable in all cases of suspected Paget's disease for the purpose of accumulating data on the relative incidence of the bones involved and for the elaboration of diagnostic information. Characteristic changes in the pelvis are frequent and permit a definite diagnosis in the absence of skull manifestations.

When the involvement is early, faint striations are usually seen in the ischium or pubes. Subsequently the ilia become involved. When the disease is still further advanced marked bowing deformities of the pelvic walls occur with marked protrusion of the acetabula into the pelvis producing the characteristic Otto-Chrobach deformity. Frequently, the pelvis is involved to such an extent as to be the basis for a positive diagnosis when the skull may show no changes whatsoever. This has been observed at least six times in the author's experience.

RANDALL, LAWRENCE M. Lipiodol as an adjunct to tubal inflation in the diagnosis of sterility. *Am. J. Obst. & Gynec.*, September, 1926, xii, 326-331.

Lipiodol offers a further means of accurately diagnosing tubal obstruction and stenosis as a cause of sterility in women. After tubal inflation has shown non-patency or stenosis of the tube, the site of closure or stenosis can be accurately detected with lipiodol. This information is of value in considering the advisability of surgical intervention in an otherwise normal pelvis. Such tubes are always symptomless and frequently unaccompanied by other pelvic lesions, hence there would be no other indication for operation.

As a rule, women who consult physicians primarily because of sterility are otherwise normal, and it is not justifiable to subject them to surgical operation without the benefit of as

accurate a diagnosis as possible. Uncomplicated tubal occlusion is a frequent cause of sterility and the question of laparotomy is often brought up by the patient. If the site of closure can be located, one can much better judge the value of operation in a given case. Should the obstruction be in the narrowed portion of the tube, the prospect of success from a plastic operation of the tube will not be good. With pathologic change at the fimbriated end, which is relatively common, and the lumen patent to this point, operation may be justifiable. It carries with it a fair chance of success provided other conditions are normal. Three illustrative cases are cited.

The technique of injecting the lipiodol is simple and involves no special apparatus. Ten cubic centimeters of the oil is sufficient for an ordinary case, and often 5 to 7 c.c. is enough. The injection is practically painless, the technique demanding the same care that is used in transuterine inflation of the tubes by the method of Rubin.

SCHIESSL, M. Fractures of the transverse process of the spine. *Deutsche Ztschr. f. Chir.*, 1926, cxvi, 297-306.

Recognition of this form of fracture was rare before the advent of roentgen rays. Roentgenograms show that fractures of the transverse process are often associated with fractures of the vertebral bodies. Isolated fractures of the transverse process have been described only recently as occurring exclusively in the lumbar spine. The author has had good opportunity to observe a number of cases in a mining community in Alsace. The material confirms the fact that most of the fractures occur in the lumbar region, but he has observed 2 cases in which the fracture of a transverse process occurred in the thoracic spine.

A total of 23 cases of isolated fractures of the transverse process of the lumbar spine was observed from 1919 to 1925 and these are briefly cited.

There is no distinctive symptom-complex associated with these fractures. The local pressure pain, blood effusion and restricted motion, are also present in contusions and distortions without involvement of the bone. The degree of disability is extraordinarily variable, and frequently patients walked to the doctor's office for examination. The precise recognition of the condition can be made roentgenographically. It is nowadays absolutely necessary to subject to roentgen examination all cases with local pressure pain in the region of the lumbar spine. As a result, many cases of lumbago, contusion and distortion become unmasked and are shown to be transverse fractures. In

the roentgenogram, the true fracture shows itself by the presence of distinct diastases in the transverse process, or at least fracture lines with displacement of the fragments toward each other. To regard linear shadows or thickenings as old fractures is not always justifiable where epiphyseal lines are present since it has been shown that the transverse processes of the first lumbar vertebra can retain these epiphyseal lines even after the individual has attained the age of twenty-five. Characteristic for the isolated transverse fractures in the lumbar vertebrae is their unilateral occurrence. Only 2 of the author's cases showed bilateral fractures. The treatment is immobilization, and the end results are good. In only one case was the occupational activity of the patient limited as a result of the fracture.

SCOTT, S. GILBERT. Secondary jejunal ulcers and their radiological diagnosis. *Lancet*, July 31, 1926, ii, 222-224.

Primary jejunal ulcers, that is, those ulcers which form primarily in the jejunum, not secondary as the result of a gastroenterostomy, are extremely rare. Secondary jejunal ulcers, however, are a serious drawback to the otherwise valuable operation of gastroenterostomy for gastric ulcer. As in gastric work, roentgenograms alone are of little diagnostic value, because most jejunal ulcers are extremely difficult to record on a roentgenogram even after they have been located on the screen. Under present conditions roentgenologists should not give a diagnosis of an organic lesion of the intestinal tract unless the lesion has been visualized on the screen. The hand and eye properly trained are of greater diagnostic value than roentgenograms, and direct evidence of gastric lesions in nearly 100 per cent of cases is believed possible in the near future if this fundamental fact is thoroughly grasped and recognized.

The roentgenologist in the course of his gastric work examines many cases where symptoms point to ulceration of the jejunum after gastroenterostomy, but such ulceration is probably seldom detected. The large majority of these ulcers can however be located accurately. The method to be followed is based on the same principle as that used in gastric work, that is, systematic roentgenoscopic palpation. It takes time and perseverance to become proficient in the art of palpation.

The main features of the method are as follows: A meal of creamy consistency is used and only a small quantity (3 oz.) of this is administered at first. This is important as a full meal of 6 to 7 oz. will defeat one's object. By means of pressure of the hands on the abdo-

men the opaque substance comes under full control. It is then possible to smear the cream over each section of the mucous membrane systematically. This procedure is termed by the author as "whitewashing" the interior of the stomach. The systematic examination of the whole stomach and duodenum must be emphasized, that is the whitewashing process must start at the cardiac end working down inch by inch and ending at the jejunum.

WILLIS, T. A. Pott's abscess. *Surg., Gynec. & Obst.*, September, 1926, xliii, 285-292.

A detailed study was made of 4 tuberculous vertebral columns from cases having no known history of syphilis or gross evidence of this disease. Roentgenograms of the cadavers showed cold abscesses of the vertebral columns at the cervical, upper thoracic, thoracolumbar, and lower lumbar areas; also of the manubrium sterni. These findings indicate the possibility of multiple lesions in Pott's disease with consequent necessity of a thorough roentgen examination to disclose them. There was also evidence of productive changes in the bone in active tuberculosis, as well as in old healed specimens. The frequency of involvement of articular and muscular processes in addition to the vertebral bodies is also noted. Even in extensive lesions there was a notable absence of angulation or other deformity. The coexistence of extensive lesions with merely superficial erosion of the bone is emphasized.

There was also observed great frequency of abscess formation and the subdivision of the abscess into successive pockets effectually shut off from the thoracic and abdominal cavities but open dorsally between the transverse processes and ribs. There is clinically a fixation of the abscess walls to the middle of the vertebral bodies, and not to the intervertebral discs as would be suggested by the anatomical descriptions of the anterior common ligament.

MARTIUS, HEINRICH. The radiation treatment of adnexal tuberculosis in the female. *Strahlentherapie*, 1926, xxi, 260-265.

There is a definite field of usefulness in the treatment of tuberculosis of the female genital adnexa with mild doses of roentgen rays. This, however, does not exclude surgery as the method of choice in those cases in which the disease has not advanced too far. All cases which are clearly diagnosed as genital tuberculosis, even when offering the possibility of local and general operability, are no longer from the standpoint of experience, suitable for surgical treatment. An energetic attempt should be made to control the disease in these cases with roentgen rays supported by the usual conservative medical measures.

There can be no doubt that it is more desirable to avoid an operative removal of tuberculous genital organs in cases in which there are extensive adhesions to the intestines, because of the danger of producing fistulas. In such cases all one can do is to remove ascitic fluid and depend upon the action of roentgen rays.

There is a further field for roentgen therapy in postoperative irradiation of all operated cases, especially those with fistulas. In this field the reports on the effects of roentgen therapy are encouraging.

The technique of irradiation, direct or postoperative, is as follows: The lower abdominal region is exposed in a large field bounded above by the level of the umbilicus, below by the symphysis pubis and laterally by the anterior superior iliac crests. This area is irradiated at a focal distance of 35 cm., through 1 mm. Zn plus 1 mm. Al, with direct current of 6.5 mm. spark gap between large spheres. This field receives an incident primary irradiation of 150 R, i.e., 25 per cent of the average erythema dose of 600 R. This irradiation requires 12 min. when 4 ma. are used. Three irradiations are given at intervals of eight days. The number of treatments is dependent upon the results obtained. In general, a series such as the above may be repeated at intervals of eight to twelve weeks. In cases of concurrent peritoneal tuberculosis, the abdominal field is extended above the umbilicus. This radiation therapy is safely within the roentgen castration dose.

MOSCHCOWITZ, ALEXIS V., COLP, RALPH, and KLINGENSTEIN, PERCY. Late results after amputation of the breast for carcinoma. *Ann. Surg.*, August, 1926, lxxxiv, 174-184.

The follow-up results three years after amputation of the breast are not considered as of great value, and even the results after five years cannot be considered as absolutely conclusive, since too many patients die after this period from recurrences or metastases.

For all practical purposes the fate of the patient is sealed at the time of the operation. The prognosis depends upon three factors: (1) the local extent of the process; (2) the presence

of distant metastases, and (3) the care with which the operation is done. The modern operation is usually successful in eradicating the local process, as is evidenced by the very large number of cases dying from distant metastases without even a suspicion of recurrence at the site of operation. The late results of the operation are not as favorable as one might be led to believe from a cursory examination. At the present writing the surgeon is practically powerless in the presence of distant metastases.

The above are the conclusions drawn from a review of cases of breast carcinoma admitted at the Mt. Sinai Hospital, New York, from Jan. 1, 1915, to Dec. 31, 1924. There were 374 patients, in 218 of whom there were available complete reports suitable for analysis.

Since prophylactic roentgen irradiation was employed in only 6 of the patients, it is impossible to state accurately the benefits of preoperative irradiation. At the present time postoperative irradiation is employed almost as a routine measure, but recurrences have been observed to begin and increase in areas most intensively treated. A number of patients who are now alive and well and who are included in the follow-up statistics have received the benefits of postoperative irradiation. How much this has influenced longevity is conjectural.

LAQUERRIÈRE and DELHERM. High frequency currents in the treatment of circulatory disturbances, *J. de radiol. et d'électrol., Par.*, July, 1926, x, 294-299.

Excellent results have been reported by many authors, especially American ones, from the thoracic application of diathermia in general diseases of the circulation but the authors of this article believe that while the various methods of application of high frequency currents may improve the functional symptoms they do not have any great effect on a constant hypertension nor on the hardened arteries in arteriosclerosis. The conditions in which they have found diathermia extremely useful are local conditions, such as frost-bite, Raynaud's disease, obliterating arteritis and diabetic gangrene.



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Further particulars are offered to the readers of the advertisement on Neo-Silvol which appears on another page of this issue.—*Parke, Davis & Co.*



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KIDNER, FREDERICK, C. An unusual case of Legg-Perthes' disease. *J. Bone & Joint Surg.* July, 1926, viii, 565-569.

The case occurred in a boy aged eight whose general physical examination was entirely normal with the exception of the lower spine, the left hip and thigh. There were also moderately enlarged tonsils.

The spinal roentgenogram showed nothing abnormal except occult spina bifida of the fifth lumbar vertebra. The hip showed great shortening of the neck of the femur with considerable increase in thickness. The appearance was as though the head had been completely destroyed and had left a rough superior surface to the neck. The head was represented only by three very faint shadows which might represent a disintegrated ossification center. The acetabulum was wider and flatter than normal and there was some loss of calcium in the left side of the pelvis. The only tenable

diagnosis at this time seemed to be Legg-Perthes' disease or coxa plana.

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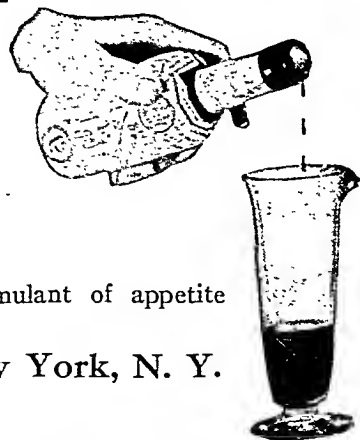
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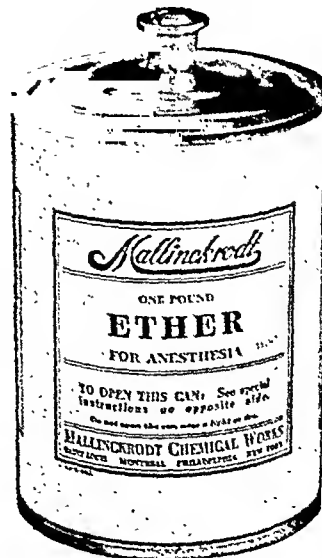
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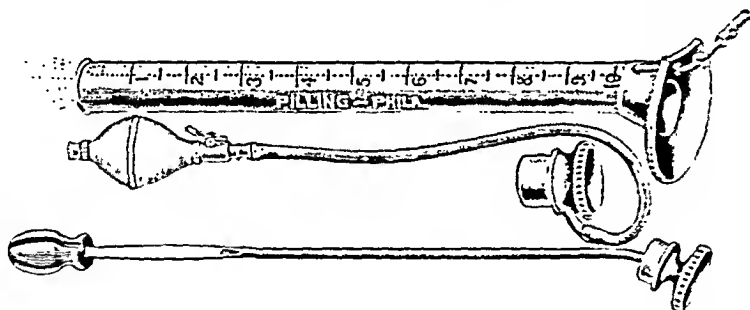
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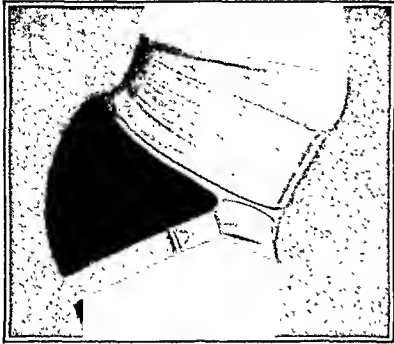
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RONGONI, LUIGI. Clinical and roentgen study of the etiology and pathogenesis of Osgood-Schlatter's disease. *Radiol. med.*, August, 1926, xiii, 557-562.

The author describes 5 cases of Osgood-Schlatter's disease in which both the clinical and roentgen pictures indicate strongly that it was due to inflammation with reaction of the tissues around the bone; there was no history of trauma and no history or evidence of syphilis, tuberculosis or late rickets. A study of the clinical course of these cases which began with fever and pain seems to show that an inflammatory element is necessary to produce the clinical picture of this disease which generally affects subjects of delicate constitution in whom the action of the bacteria or toxins is facilitated by a preexisting condition of insufficient development of the centers of ossification or by a condition of dysplasia. In all probability various forms of pathogenic bacteria may act on the anterior tuberosities of the tibia in adolescents.

RUSCONI, MATTEO. Enterolith without occlusion observed a long time after a barium meal. *Radiol. med.*, July, 1926, xiii, 487-491.

A man aged seventy-three was sent for roentgen examination because of a suspicion of gastric ulcer. The results were indefinite and

he was told to return a month later for another examination. On this examination an intensely opaque shadow about the size of a hazelnut was seen in the left flexure of the colon which on respiratory movements followed the colon. On various examinations practiced for a period of eighty days the shadow was always found in the same place. As this shadow was not found on the first examination the conclusion was reached that it must be due to the barium given at that time, but the question remained of what could have caused its arrest in the colon. Solitary diverticulum of the colon is rare. They generally present multiple rounded shadows smaller and less dense than this one. At the end of the eighty days the patient came and reported that the day before he had had nausea and vomiting and had taken a saline purgative after which he passed a copious stool containing eight or ten small whitish bodies. Another roentgen examination showed that the shadow in the colon had disappeared. The enteroliths, which were evidently fragments of the one that had caused the shadow contained calcium salts and a still larger proportion of barium salts. The author concludes that there had probably been a pseudodiverticulum of the colon caused by pericolicitis and that adhesions had bridged a haustrum, retaining a small mass of fecal matter.

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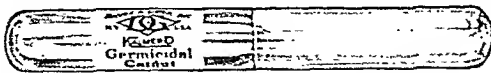
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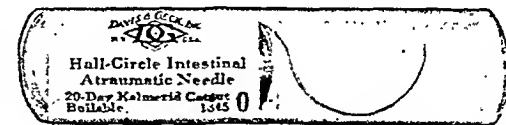
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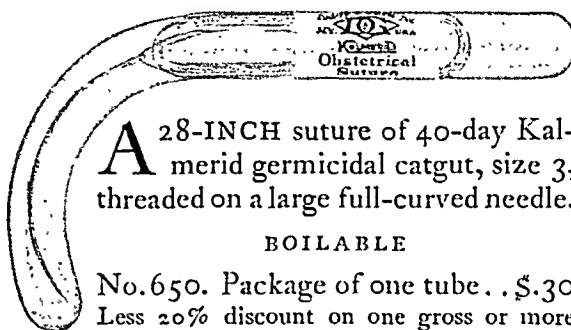
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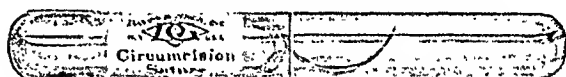


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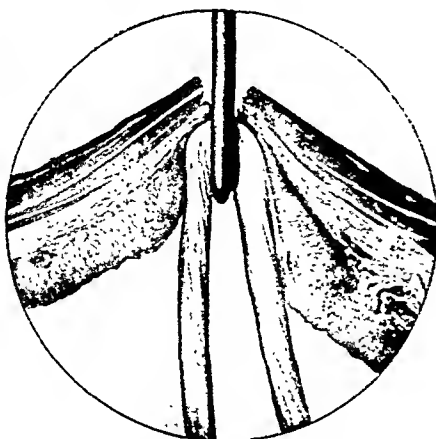
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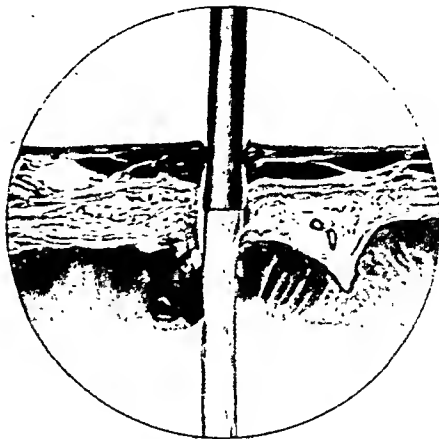
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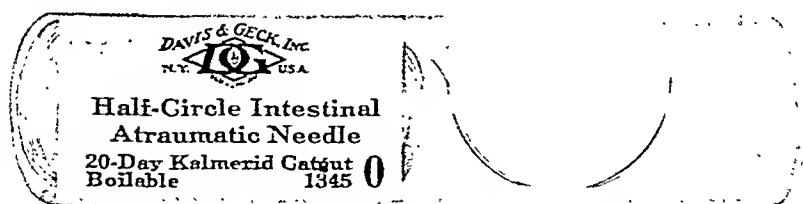
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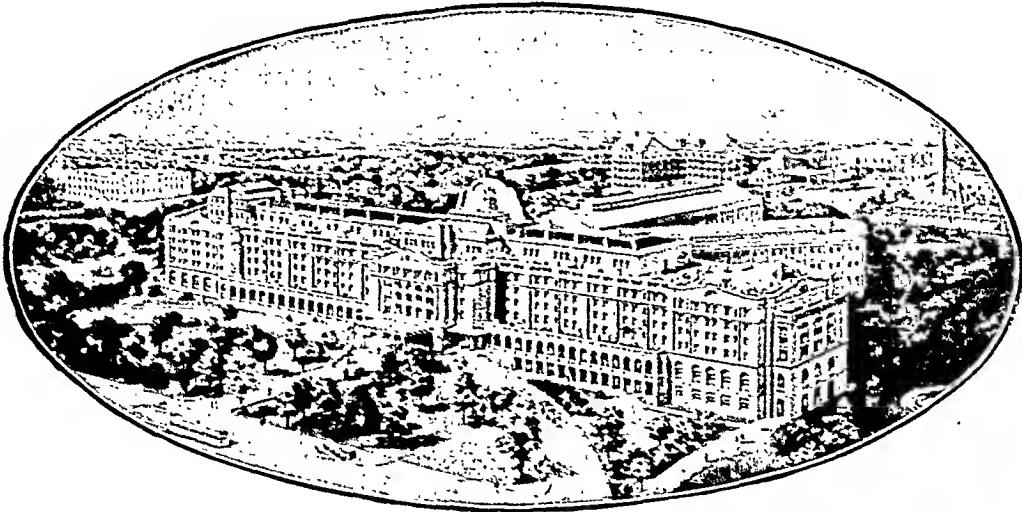
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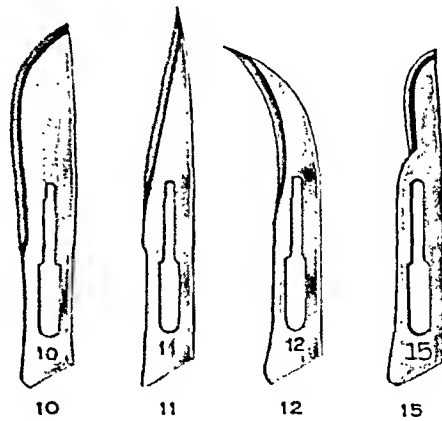
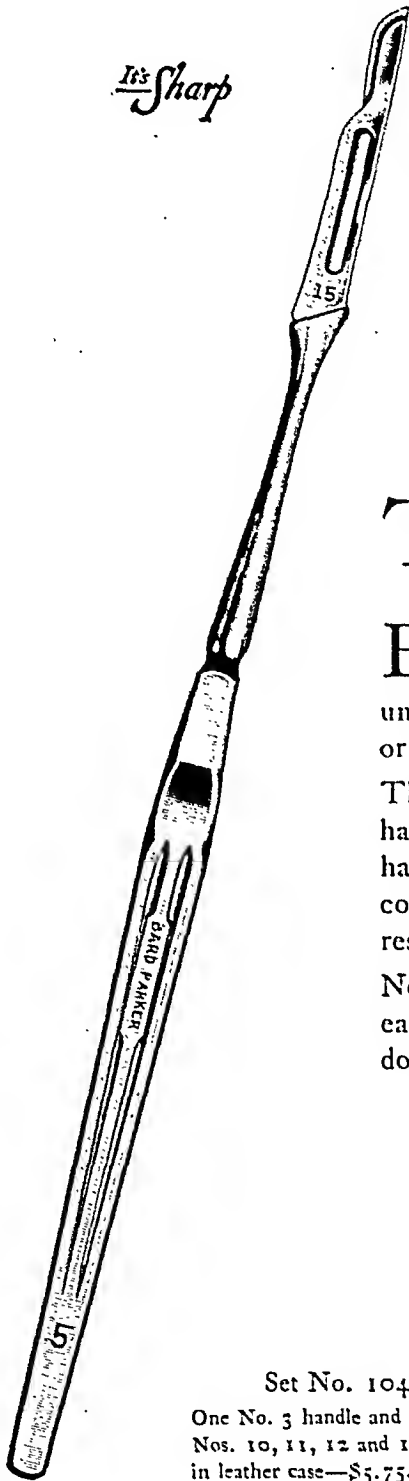
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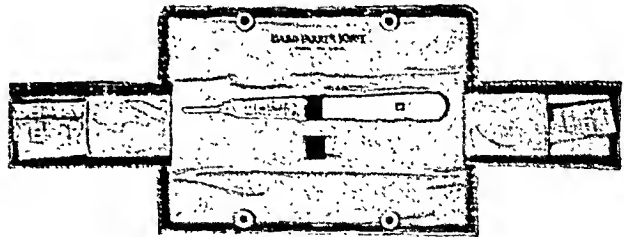
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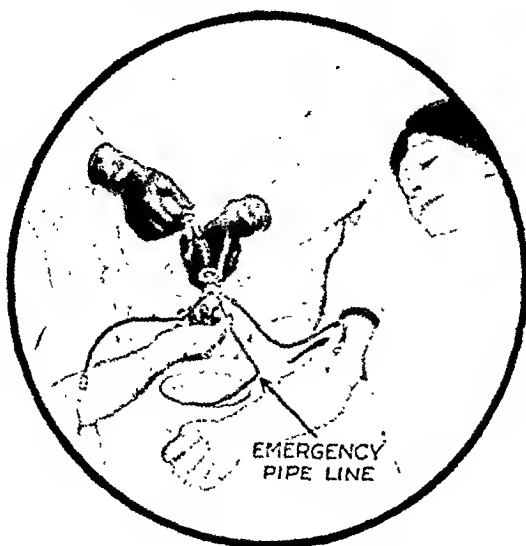
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## A METHOD OF TREATING FRACTURES OF THE FEMUR IN ADULTS

NELSON W. CORNELL, M.D.

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THERE are at the present time four generally accepted methods for the treatment of fractures of the femur, namely:

1. Application of plaster of Paris spica.
2. Open operation and application of a metal plate, or bone pegs.
3. Skin traction with suspension.
4. Skeletal traction with suspension.

1. *Application of Plaster of Paris Spica.* This is a method applicable principally to fractures of the neck of the femur and cannot often be used satisfactorily in fractures of the shaft of the bone.

2. *Open Operation.* This method is very effectual in certain types of fracture of the femur, especially those in the middle third of the bone. There is, however, always the danger of carrying in infection by the application of metal plates or bone screws, so that it is a procedure to be avoided whenever possible. In addition, this operation on the femur requires considerable skill and should not be attempted by every surgeon who is called upon to handle such a fracture.

3. *Skin Traction with Suspension.* By suspension is meant slinging the thigh and leg in a Thomas splint with an extension leg piece attachment. Skin traction and

suspension are applicable to certain types of cases where the overriding of fragments is not great. Here the difficulties are slipping of the adhesive material, blistering and pulling of the skin, tearing off of the apparatus by the patient, etc.

4. *Skeletal Traction with Suspension.* By this is meant the application of tongs to, or a pin through, the lower end of the femur and suspension in the Thomas splint. This is the method that we have used on our service at The New York Hospital and I believe it is more widely used today than the others cited above. By skeletal traction and suspension better control of the fracture is obtained and the overriding fragments are pulled down with less weight and with less discomfort to the patient.

While this method has been in use on our service over a period of several years and while we have obtained satisfactory end-results in the majority of cases, nevertheless we have found that it has consistently brought out the following difficulties:

- (1) Lack of cooperation of the patient.
- (2) Mechanical difficulties.
- (3) Difficulty with the nursing care.
- (4) Discomfort.

(1) *Cooperation of the patient* in any surgical problem is highly essential in order to carry out the proper treatment and this is especially desirable in fractures of the femur.

It has not infrequently been the experience of the House Staff on morning rounds to find that a delirious or excitable patient has torn off his entire apparatus. More frequently the patient "cooperates" by slipping the traction ropes from the pulleys during the night or, unknown to the staff,



FIG. 1. Application of the first layers of plaster from axilla to knee joint with tongs inserted. Note the angle of flexion at the hip and at the knee joint.

he will have all traction in place for rounds and then as soon as the doctors are out of sight, slip the ropes from their pulleys once more.

Again, it is a very rare patient, indeed, who will move his various joints while under treatment by this method, especially in the early, painful stages. All of these things we have found to be fairly constant factors in the majority of our cases.

(2) *Mechanical difficulties.*

(a) *Muscle action.* It has been most difficult to maintain proper angles at the hip and knee joint to secure muscular relaxation. The angles may be properly adjusted for the moment, but any movement or shifting of the patient may disturb them. Again, a movement by the patient may throw the muscles into spasm, which tends to throw the fragments out of any align-

ment that has been obtained. With the incomplete relaxation of the muscles we have found it necessary at times to use as high as 40 to 50 pounds' weight to bring the fragments into apposition, and not infrequently the overriding is overcorrected before it is discovered.

(b) *Alignment of fragments.* By the use of Canton flannel strips to support the thigh we have experienced most difficulty in keeping each individual strip at its proper tension on the bars of the splint,



FIG. 2. The wire spade which may be made from an old Thomas splint.

so that the fragments at the site of fracture would not sag or be displaced to either side. We have found no way of keeping these strips from shifting or stretching, while many of the splints will sag and bend inward, due to the tightening of these strips.

(c) *Facilitation of handling the patient.* Roentgenograms made with our portable apparatus have been poor, especially the lateral views.

(3) *Difficulties in Nursing Care.* Care of these patients by the nurses is a problem. A complete change of bedding and mattress is nearly impossible in the early and more

painful stages of the treatment by this method. Likewise, shifting of the patient onto a bed pan is often difficult, due to pain. It is quite impossible to remove the patient from his bed.

(4) *Discomfort of the Patient.* We have found in the early stages of traction and suspension that our patients complain bitterly of the perineal ring which may be too large or too small. It is extremely uncomfortable at best, if any great amount of weight is being used. Motion of the fragments against each other with consequent muscle spasm is another unhappy experience when the patient moves.

Because of the difficulties mentioned above the following method was devised, which, so far as we can ascertain, is original. It is founded on:

1. Skeletal traction by tongs or a pin,
2. Fixation of the hip joint,
3. Control of the knee joint with consequent muscular relaxation,
4. Control of the fragments with plaster of Paris spica during reduction, and their fixation after reduction.

The patient is placed on a Hawley table, anesthetized by gas or ether; then lifted on a sacral rest with the perineal bar in place. Tongs or a Steinmann pin is then placed in the bone just above the condyles under strictly aseptic technique, cutting a small slit through the skin on either side, so that the points of the tongs or pin coming in contact with the bone do not pass through the skin. An assistant then makes strong traction downward on the pin or tongs with the hip flexed to an angle of approximately  $140^{\circ}$  and abducted only one-half the angle that would be used in a fracture of the neck of the femur. The assistant holds the leg with the other hand, the knee joint being flexed to an angle of  $120^{\circ}$ . A second assistant makes traction on the other leg sufficient to keep the pelvis from tilting. (Fig. 1.)

Stockinette is then applied, from the axilla to the knee. Rolled non-absorbent cotton covers the stockinette and is in turn covered with crepe paper bandages. All bony prominences are doubly padded. A

plaster of Paris spica is then applied from the axillae down to just behind the Steinmann pin or tongs while strong traction and the original angles at the hip joint are maintained.

After several layers of plaster bandage have been applied, an iron bar bent in the shape of a spade is incorporated in the thigh portion of the spica, exactly parallel with the line of the femur. The bar may be made easily from an old Thomas splint which has had the ring removed. (Fig. 2.)



FIG. 3. The leg piece attached, with pulley on end of wire spade and traction over the pulley.

A piece of rope is then passed from the tongs or the pin to the end of the bar and tied. A Pierson extension leg piece is applied, being attached slightly behind the knee joint, with Canton flannel strips to support the leg and a strip of adhesive plaster on the foot to prevent dropping of the toes. (Fig. 3.)

The patient is then placed in a bed on which a Balkan frame has been erected and a rope is tied to the end of the wire spade and up to the Balkan frame, so as to pre-

vent any displacement of the wire downward after the weights have been applied by shifting the pulley from one side to the other, or raising and lowering it.



FIG. 4. The apparatus completed, with patient in bed in a semi-reclining position. Note the rope attached from the end of the wire spade to the Balkan frame.

to the traction over the pulley. No traction is placed on the leg. The angle at the knee joint together with its own weight will keep

The angle at the hip joint allows the patient to be placed in a semi-reclining position with the thigh flat on the mattress



FIG. 5. The plaster of Paris spica completed and tongs removed. The hip joints and knee joints are still in a position of flexion.

the tibial and femoral surfaces apart as the femur is pulled down. (Fig. 4.)

A weight of 8 to 10 pounds is applied and the lower fragment is amply controlled

and the leg well out of bed. The spica itself put on, as it is, well up in the axillae and with the angle at the hip joint, together with the weight of the patient's

own body upon it, is sufficient counter-traction for the pull exerted on the tongs or pin. This makes the entire apparatus in one piece with traction and countertraction combined.

Roentgenograms are made frequently until the fragments are pulled into good alignment, which occurs surprisingly soon. After seven to ten days, if the fragments are in satisfactory apposition, with the traction still on, the foot and leg are encased in circular plaster up to the attach-

fracture and the position, the spica is bivalved, and the fracture site is tested for union. If it is found firm, the entire cast is removed. Following this, baking and gentle massage are begun and the patient is fitted with a walking caliper splint.

From the use of this method the following facts have been learned:

1. Active cooperation of the patient is not necessary, as the apparatus is applied while he is under the anesthetic and it is practically impossible for him to tear it off.



FIG. 6. Case cited. Anteroposterior and lateral views of fracture.

ment of the skeletal traction. This may be done in three or four days with safety. Anterior and posterior molded splints are then applied to the knee joint to bridge over the gap between the leg and the thigh spicas. This fresh plaster is allowed to harden until there is no danger of disturbance of the leg or thigh and then the pin or tongs are removed. Then there is a complete plaster of Paris spica from the axillae to the toes, with the fracture reduced and firmly held. (Fig. 5.)

The fracture is then roentgenographed from time to time and at the end of six to eight weeks, depending upon the type of



FIG. 7. Anteroposterior view of the same fracture after removal of plaster at the end of eight weeks.

2. Muscle action is reduced to a minimum as muscle rest is obtained by the angles of flexion at the hip and knee joints. These angles are constantly maintained by the plaster spica which eliminates shifting and spasm.

3. Less weight is necessary under this method of treatment; with relaxed muscles, the pull is a gentle, steady one and the fragment is easily drawn down.

4. The plaster spica prevents sagging, buckling and displacement in a lateral plane as the fragments are pulled down.

5. Rapid correction and apposition of fragments and the maintenance of that

position are obtained much more easily than by other methods.

6. Earlier union is secured by the absolute immobilization after reduction, the repair process being undisturbed in the early stages.

7. Early removal of the skeletal traction is possible, so that there may be no danger of bone necrosis and smaller incidence of infection. (The tongs or pins may be removed as early as the second or third day, if there is any evidence of infection.)

8. The whole apparatus, including traction and countertraction, is in one piece, making it a simple mechanical problem.

9. The patient is comfortable after the first twenty-four hours. None of our patients has complained about the fracture site being painful or uncomfortable. They can be moved at will and taken to the X-ray Department without disturbing either the fracture or the traction. Likewise, they may be moved to a stretcher for the purpose of changing their beds. In addition, the patient is in a semi-reclining position which is comfortable and after the traction is removed and the plaster spica is completed, they may be turned over in bed. This is especially important in old people.

10. The nursing care is much simplified by the fact that the position of the patient can be shifted.

11. The problem that these cases presents to the staff is likewise simplified, for once the patient is put in this apparatus he does not have to be touched again until the traction is removed and the spica completed. After the latter is done, the job is practically finished.

It will probably be justly said of this method that the complete immobilization in plaster gives rise to loss of muscle tone from the lack of exercise and danger of injury to the joints. So far we have experienced no greater atrophy and loss of muscle tone in this apparatus than when the Thomas splint with traction was used. As for joints, limitation of motion was found to be less than in other methods

where the joints were supposed to have been kept active by motion.

I will cite one illustrative case on which this method was used and which was controlled by it, when it seemed at first the fracture would have to be operated on:

M. P., female, aged sixty-eight years, admitted with a long spiral fracture of the lower and middle thirds of the right femur, the ends of the fragments overriding about 2 inches and forming an angle of about 90°. The leg and lower thigh were completely externally rotated and were practically flail. (Fig. 6.)

Under gas anesthesia the apparatus was applied. Good reduction of the fragments was obtained with 10 pounds' traction, and on the tenth day the plaster spica was completed and the tongs removed. The patient had the benefit of a semi-reclining position throughout this period, which, at her age, we consider most important in order to avoid pulmonary complications. After the plaster was completed the patient was turned on her face three times a day for a period of from one-half to one hour and, although her general condition was very poor, being incontinent, involuntary and refusing food part of the time, she had no pulmonary complications.

At the end of eight weeks the plaster was completely removed and solid union was found. (Fig. 7.) Anatomical and weight-bearing position of the fragments was very good. There was no shortening of the femur. Passive motion of the right knee joint was equal to that of the left, with full flexion and extension. Active motion was present and increased by daily exercise and massage.

At the end of ten weeks the patient was ready to wear a walking caliper. This was delayed somewhat by her feebleness.

This was one of the most difficult types of fracture of the femur, yet it responded to this type of treatment very successfully. We have tried it on two other cases of fractured femur with equal success. A series of cases will be reported later.

#### CONCLUSION

This method is not offered as a cure-all for fractures of the femur, but is proposed as a means of overcoming difficulties that are encountered in the treatment of these fractures.

This method is also applicable to bad fractures of both bones of the leg by the use of a Steinmann pin through the os calcis and a series of such cases will be reported later.

I wish to express my gratitude to the other members of the Attending Staff and also to the House Staff for the many ways in which they have aided me in this work.



[SURGICAL SUGGESTIONS]

THE stomach tube is a valuable therapeutic instrument in the armamentarium of the surgeon, pre- and post-operatively. Empty the stomach in all cases of peritonitis or intestinal obstruction before operating. Empty the stomach in all cases of undue vomiting after operation.

PERSISTENT postoperative vomiting is sometimes due to acidosis from insufficient feeding.

IN SEEKING a cause for inguinal adenopathy examine the anus and lower rectum.



# MULTIPLE FRACTURES

## REPORT OF TWO UNUSUAL CASES

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THE term "multiple fractures" may apply to the simultaneous fracture of one bone in several places or of several different bones. In the first and second series of the Index Catalogue of the Library of the Surgeon General, numerous cases were listed under the heading "multiple fractures." This classification, however, fails to appear in the third series (Fractures, 1925). Most writers on fractures recognize and define this term (Stimson,<sup>1</sup> Speed,<sup>2</sup> Eisendrath,<sup>3</sup> Da Costa<sup>4</sup>).

Patients with multiple fractures have generally been subjected to such tremendous violence that many of them die almost immediately after the injury. This may account for the relative rarity of these cases in hospital statistics. Once admitted to the hospital the shock is generally the outstanding feature and should be treated first irrespective of the fracture therapy.

Strictly speaking, many of the pathological fractures are multiple. Scudder<sup>5</sup> classifies these fractures as follows:

A. Symptomatic fragilitas ossium (alterations in strength of bone by local conditions)

- (1) New growth (sarcoma, carcinoma)
- (2) An infectious or inflammatory process (infections: osteomyelitis, tuberculous osteomyelitis, syphilis, syringomyelia)

(3) Osteomalacia

(4) Rickets

B. Idiopathic fragilitas ossium

- (1) Osteogenesis imperfecta (brittle bones)

Greenthal<sup>7</sup> reported an infant aged three months having infantile scurvy and hereditary syphilis. This patient had multiple

fractures of both tibiae and femora just proximal to the epiphyses of the lower ends.

Joseph-François Malgaigne, who published his treatise on fractures<sup>6</sup> in 1847, found that of 2358 fractures at the Hotel Dieu, 30, or 1.28 per cent, were multiple. Malgaigne said that he "happily saved from oblivion" one of Dupuytren's ideas, namely "that the danger of wounds and of fractures, although doubtless increased by an increase in their number, is still not in direct ratio with that number . . . when there are several fractures each one induces slighter symptoms than if it were by itself." He believed that consolidation occurred more readily in multiple fractures.

In 1907 Ashhurst<sup>5</sup> wrote an excellent paper on multiple fractures, dealing particularly with those of the upper extremities. From 1902 to 1906 there were 5057 fractures at Episcopal Hospital in Philadelphia. Of these, 73, or 1.44 per cent, were multiple. Omitting amputations and fatal shock cases, the multiple fractures had a mortality of 27.4 per cent.

Ashhurst classified multiple fractures as follows:

I. Fractures of the skull or trunk and the extremities

II. Fractures of different extremities

(a) Similar (e.g., both legs, both clavicles, etc.)

(b) Dissimilar (e.g., leg and forearm, etc.)

III. Multiple fractures confined to one extremity.

Ashhurst collected Malgaigne's and his own cases, together with those in the Surgeon General's Catalogue (Series I and II) and compiled the following table:

DISTRIBUTION OF MULTIPLE FRACTURES (Asbburst)

	Malgaigue	S. G. Office Series I	S. G. Office Series II	Episcopal Hospital, Philadelphia	Total	Per Cent
I. Skull or trunk and extremities:						
Skull and extremities.....	7	13	8	11	39	16.25
Trunk and extremities.....	3	38	6	10	57	23.75
Skull and trunk.....	1	8	3	1	13	5.41
Trunk alone.....	0	5	3	2	10	4.20
II. Different extremities:						
Similar lesions.....	10	6	6	7	29	12.08
Dissimilar lesions.....	6	20	9	35	70	29.16
III. One extremity:						
Upper extremity.....	0	7	1	7	15	6.25
Lower extremity.....	3	3	1	0	7	2.90
Total.....	30	100	37	73	240	100.00

Taylor's case<sup>7</sup> is worthy of mention. In it there were fractures of (1) left humerus, surgical neck; (2) left humerus, middle of shaft; (3) left radius; (4) left ulna; (5) right humerus; (6) right radius, upper third; (7) right radius, lower third; (8) right ulna. This patient recovered.

#### REPORT OF CASES

CASE 1. A. F., aged forty-nine, was admitted to the Evanston Hospital on July 3, 1926. He had fallen or been thrown between two cars of an electric train. He had evidently been struck by the car and the wheels had passed over the left leg. Save for a few strands of fibrous tissue and skin there was a traumatic amputation 2 or 3 inches above the ankle joint. When first seen about thirty minutes after admission there was no bleeding from the wound. The patient was warm, had an excellent pulse, and was well oriented mentally. Tetanus antitoxin was given. He was taken to the operating room and a circular amputation was done at the middle third of the leg. The postoperative course was difficult owing to an acute dilatation of the stomach which was evidenced by repeated vomiting beginning shortly after the operation. A stomach tube revealed a large quantity of dark brown fluid in the stomach. Gasric lavage was done repeatedly (seven times in all) and this complication was remedied.

The postoperative pulse averaged 80 and the temperature 99° F. In view of the patient's poor condition roentgenography was deferred

until some days later. Dr. E. L. Jenkinson, the roentgenologist, discovered the following multiplicity of fractures (the fractures of the tibia and fibula are included for completeness although they were not roentgenographed):

1. Fracture of left tibia (compound comminuted).
2. Fracture of left fibula (compound comminuted).
3. Fracture of the body of the fourth lumbar vertebra (compression fracture with dislocation backward).
4. Fracture of articular process of the fourth lumbar vertebra.
5. Fracture of spinous process of second lumbar vertebra.
6. Fracture of spinous process of third lumbar vertebra.
7. Fracture of left transverse process of first lumbar vertebra.
8. Fracture of left transverse process of second lumbar vertebra.
9. Fracture of left transverse process of third lumbar vertebra.
10. Fracture of left transverse process of fourth lumbar vertebra.
11. Fracture of right transverse process of fourth lumbar vertebra.
12. Fracture of right transverse process of fifth lumbar vertebra.
13. Fracture of eighth left rib posteriorly.
14. Fracture of ninth left rib posteriorly.
15. Fracture of tenth left rib posteriorly.
16. Fracture of eleventh left rib posteriorly.
17. Fracture of twelfth left rib posteriorly.
18. Fracture of eighth left rib in mid-axillary line.
19. Fracture of ninth left rib in mid-axillary line.
20. Fracture of tenth left rib in mid-axillary line.
21. Fracture of eighth left rib at spinal articulation.
22. Fracture of ninth left rib at spinal articulation.
23. Fracture of tenth left rib at spinal articulation.
24. Fracture of eleventh left rib at spinal articulation.
25. Fracture of eighth right rib posteriorly.
26. Fracture of tenth right rib posteriorly.
27. Fracture of eleventh right rib posteriorly.
28. Fracture of tenth right rib posteriorly (different from fracture No. 26).

It will be seen from the above that the

patient had ten fractures involving the spine, sixteen fractures involving the ribs, and two of the extremities. Although there was considerable dislocation of the fractured fourth lumbar vertebra, fortunately no cord symptoms ever developed. At first no treatment of the spinal injuries was attempted owing to the patient's poor condition and the fear of bed sores. Later, however, when the patient was allowed up in a wheel chair, a Taylor spine brace was applied. This was removed at night. The chest was not strapped with adhesive plaster. The amputation wound, which had been left wide open, gradually closed down and healed completely. A temporary artificial leg was fitted by an artificial leg maker and the patient was allowed up on crutches on the seventy-second day after admission and encouraged to use the stump.

The patient was given a vigorous course of physical therapy including radiant light and heat, massage and exposure to the ultraviolet ray.

He continued to improve in strength and health until, on the one-hundred and fortieth day after admission, he was discharged from the hospital. At this time, although still requiring the aid of crutches, he was able to get around easily, and was able to dress himself and put on his artificial leg.

CASE II. F. J. M., male, aged forty-seven years, on October 30, 1916, when attempting to raise the window in a lavatory on the tenth floor of an office building in New York where he was employed as a janitor, lost his balance and fell out of the window. He was intoxicated. He tumbled down an air and light shaft the entire ten stories, doubtless bouncing from side to side as he fell. At the bottom he broke through an angle-iron grating, striking his perineum on the upturned nozzle of an automatic sprinkler. The impact against the sprinkler automatically turned in a fire alarm, and when I arrived in a New York Hospital ambulance, the fire department was already there. The firemen finding an unconscious man turned the fire hose on him and revived him, much to his astonished indignation.<sup>8</sup> The patient was admitted to Bellevue Hospital to

the service of Dr. John A. Hartwell. Here it was found that in addition to the lacerated wound of the perineum the patient had sustained the following fractures:

1. Comminuted fissure fracture of the right humerus, compound.
2. Comminuted fissure fracture of left tibia, through malleolus and without displacement of fragments.
3. Fissure fracture of right radius (distal end).
4. Fracture of tip of styloid process, right ulna.
5. Fracture of right fourth rib, posteriorly.
6. Fracture of right fifth rib, posteriorly.
7. Fracture of right sixth rib, posteriorly.
8. Fracture of right sixth rib, in mid-axillary line.
9. Fracture of right seventh rib in posterior axillary line.
10. Fracture of proximal phalanx of left little finger.

On admission the perineal wound was sutured and five days later a cast was applied to the left foot and ankle and a splint to the left little finger. The right chest was strapped with adhesive. Two weeks after admission the patient was up in a wheel chair and on the twenty-eighth day was discharged from the hospital and referred to the Out-Patient Department for further treatment.

Of interest in this case is the fact that, despite the great violence involved, the injuries were not greater, and the shock was minimal or absent.

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# THE DEVELOPMENT OF OUR KNOWLEDGE OF THE THYROID GLAND\*

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IN a paper of this sort it is usual, I believe, to present the results of a study of a group of cases, or of a piece of original research; I have certain misgivings, therefore, in departing from such a custom.

The research which I have to report is a literary one, and I fear superficial at that. Nevertheless I venture to hope that, in the midst of the discussion of the goiter problems of the day, it may be profitable to pause for a moment to consider the sources from whence our present conceptions have been derived. To attempt to give in a brief space even the scantest summary of the colossal literature on the thyroid would manifestly be absurd. What I wish to do is merely to point out certain high spots in thyroid history and indicate their bearing upon the various theories regarding the thyroid body in health and disease that we hold today.

In the first instance, as often happens in the medical sciences, an understanding of normal thyroid function was gathered largely from the study of thyroid disease. It was through its pathological enlargement that the thyroid first became known in antiquity, and until the nineteenth century thyroid literature deals largely with simple or endemic goiter. The account given of the anatomy of the gland by Thomas Wharton<sup>1</sup> in his "Adenographia," published in London in 1656, is worthy of mention by reason of its accuracy, and his interpretation of function is of interest because of the perspicacity it illustrates. Wharton was impressed, for one thing, by the extreme vascularity of the organ, and he seems to have had some glimmering of

its function in that he at least suggests that it contributes some substance to the blood; to be sure he thought it was a waste product or superfluous humor, but even so the notion is prophetic. The germ of the idea of internal secretion seems to have been in the mind of Théophile de Bordeu,<sup>2</sup> who in 1776 set forth his belief that not only every gland but every organ of the body elaborates a specific substance or secretion which passes into the blood stream, and that upon these secretions the physiological integration of the body as a whole depends. Certain pharmaceutical concerns apparently would like us to believe this in its entirety today.

The strictly chronological method will not best serve the purpose of tracing the significant advances in thyroidology, because there are several distinct lines, divergent at first, but always drawing closer together, by which these advances have been made. For convenience we may recognize an exophthalmic goiter group and a hypothyroid group. The former, which is historically older, includes the recognition and description of the syndrome, speculation as to its causation, and finally conclusions, based on the histological evidence of hyperplasia, the analogous effects of thyroid feeding and the curative ones of thyroidectomy, which show that the overactivity of the thyroid plays an important rôle. The latter comprises the gradual recognition that in the related syndromes, endemic and sporadic cretinism, myxedema and cachexia strumipriva, we have the common factor of thyroid lack, the production of an identical syndrome in animals, and the discovery

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that all may be ameliorated or abolished by the feeding of thyroid gland.

The work of Flajani,<sup>3</sup> Parry,<sup>4</sup> Graves<sup>5</sup> and Basedow<sup>6</sup> is familiar to all. Parry and Graves both gave good descriptions of the clinical picture of exophthalmic goiter. Basedow gave a better one. In interpretation Graves made an advance over Parry in that he believed that the heart's affection was purely functional. He furthermore realized that the thyroid enlargement in this disease is of quite a different nature from that in ordinary goiter. He also was aware of the extreme vascularity of the thyroid, as Wharton was, and believed that it might often become suddenly enlarged. He even compared it to erectile tissue, and wondered whether the symptoms of *globus hystericus* might not sometimes actually be due to a sudden engorgement of the thyroid.

Basedow's description is masterly. With the exception of the distinct mention of tremor, there is little in the way of symptomatology as we know it today that is lacking in his account. It is also significant that he found iodine helpful in the treatment of his patients. Unfortunately he does not give the dosage. This is undoubtedly the first use of iodine in exophthalmic goiter (1840). Twenty years before, Coindet<sup>7</sup> (1820) had reported the diminution in the size of simple goiters upon the administration of iodine salts, and since antiquity iodine-containing sea weeds and sponges had been used in the treatment of the latter disease.

The great French clinicians of the mid-nineteenth century, Trousseau, Marie and Charcot, all gave detailed and accurate descriptions of the symptoms and signs of this malady. Marie in 1883,<sup>8</sup> confirmed by Charcot in 1885,<sup>9</sup> added tremor as the fourth cardinal manifestation; the previous three, called after Basedow the *Messeburg triad*, were goiter, exophthalmos and increased heart action.

At this time theorization as to the cause of exophthalmic goiter centered chiefly about the nervous system. The disease was

regarded as a neuropathy, with the lime-light focussed for the most part upon the vegetative system. Marie, however, points out that an affection of the vegetative system alone is insufficient to account for all the manifestations, the cerebral for example, and prefers to regard it as what might be termed a neurosis of the entire nervous system. Note should be made here of the attempt by Filehne<sup>10</sup> in 1879 to produce the disease experimentally. By traumatizing or cauterizing the *corpora restiformia* in rabbits, he claims to have produced tachycardia and exophthalmos, and in one instance goiter. He thought all these changes were either vagus or vasomotor in origin; he laid the exophthalmos to engorgement of the vessels at the back of the orbit, the goiter to engorgement of the thyroid. This may well be a portion of the truth, but of course it is not all. The experiments of Cannon,<sup>11</sup> however, in 1914, in which the fusion of the phrenic and cervical sympathetic nerves in cats was followed by tachycardia, emaciation, irritability, increased sweating, elevated metabolism and in one case unilateral exophthalmos, lend great weight to the view that the sympathetic system plays at least an important rôle in the production of exophthalmic goiter.

But we are getting too far ahead. Let us leave the exophthalmic goiter subject for a moment and examine that which bears upon insufficiency of thyroid action. This perhaps may be said to start with Sir Astley Cooper,<sup>12</sup> who did thyroidectomies on two puppies in 1836 without, however, discovering anything of importance except that the animals could survive the operation. The observations made at the same time by T. W. King<sup>12</sup> of Guy's Hospital, however, are so enlightened as to justify quotation. Speaking of the thyroid he says: "Like all parts it requires to be nourished, but unlike some parts of the same class, its nourishment does not seem to be the main intention of its vascular supply." Again: "Whilst the nourishment of a part is indispensable to its existence, the influence which it exerts upon the circulatory fluids

may be more or less needful for the healthful subsistence of the entire animal," and finally: "We may one day be able to shew, that a particular material principle is slowly formed, and partially kept in reserve; and that this principle is also supplementary, when poured into the descending cava to important subsequent functions in the course of the circulation." It only requires slight paraphrasing to arrive at the modern conception that the gland increates an autacoid, thyroxin, necessary to normal life, which is stored in the colloid and later delivered to the blood stream for general distribution.

In 1847 Dr. Hugh Norris<sup>13</sup> noted a high incidence of cretinism in a goiterous village in Somersetshire, and expressed the belief that this cretinism "is not only accompanied by but in some measure caused by the presence of goiter." Three years later (1850) T. B. Curling<sup>14</sup> performed autopsies on two sporadic cretins and could find no vestige of thyroid gland in either.

In 1871 Dr. C. Hilton Fagge,<sup>15</sup> another Guy's Hospital man, pointed out the identity of the symptoms and signs of endemic and sporadic cretinism, save for the presence of goiter in the former, and wasting or absence of thyroid in the latter. Fagge's discussion is distinctly penetrating. Observing that most cases of sporadic, like endemic cretinism, are congenital, he yet recognized that the condition might be acquired. In one of his cases it was apparently acquired at the age of eight, and in the light of this he was led "to speculate as to what characters would be present should the disease (if that be possible) arise still later in the course of adult life. The peculiarities in the form of the cranial and facial bones, and in the bony framework, generally, would then probably be absent, the development of the skeleton being unalterable when once completed." He concludes that the most marked features in such a case "would be a coarseness and thickness of the soft parts of the face (especially of the lips) and perhaps of the subcutaneous tissues of the hands and feet,

besides the presence of the supraclavicular fatty tumours, and possibly a wasting of the thyroid body, if that should prove to be a constant character of the disease." In other words we have a first-class description of myxedema by a man who had never seen nor heard of a case.

The finding of actual cases by Sir William Gull<sup>16</sup> followed soon after (1874), as well as the demonstration by W. M. Ord<sup>17</sup> that they, like Curling's cretins, showed atrophied thyroids. Next came the more or less simultaneous discovery by Reverdin<sup>18</sup> (1882) and Kocher<sup>19</sup> (1883) that a like syndrome follows complete operative removal of the thyroid in human beings, or as Kocher called it, *cachexia strumipriva*. This led Felix Semon<sup>20</sup> (1883) of London to suspect the "existence of a common condition, probably a causative factor, in myxoedema, *cachexia strumipriva* and cretinism, viz. loss of function of the thyroid body." Thus we gradually have developed the clear appreciation of a group of symptoms directly due to thyroid lack, and alike in all essentials whether the thyroid be congenitally absent, destroyed or wasted by disease, or removed by the surgeon. Sir Victor Horsley's<sup>21</sup> production (1885) of a good imitation of myxedema by thyroidectomy in monkeys was a fitting culmination to this line of investigation.

Substitution therapy followed in short order. In 1890 Bettencourt and Serrano<sup>22</sup> report the relief of symptoms by the graft of half a sheep's thyroid under each breast. In 1891 Vassale<sup>23</sup> reported the prevention of *cachexia strumipriva* in dogs by the intravenous injection of an extract of their own thyroids. In the same year Murray<sup>24</sup> successfully treated a patient with myxedema by the subcutaneous injection of an extract of sheep's thyroid, and the year after two writers, Mackenzie<sup>25</sup> and Fox,<sup>26</sup> simultaneously reported good results from the administration of the gland by mouth. Both these last writers, it is interesting to note, describe what clearly were thyrotoxic symptoms when the dosage was too large.

Thus the recognition of a syndrome due to thyroid lack bore fruit, first, in the cure thereof by the giving of the gland, and second, the crowning achievement twenty years later, in the isolation of the active principle itself, the hormone or autacoid, thyroxin, by Kendall in 1915.<sup>27</sup>

We may return now to exophthalmic goiter. It is this type probably, since Marine<sup>28</sup> has shown how endemic goiter can be eradicated, and Plummer<sup>29</sup> how adenomatous goiter can be cured, that constitutes the most important goiter problem, or at least produces the greatest amount of controversy, at the present time. We left the subject with the neurogenic theory of the French school. The next step was Möbius<sup>30</sup> conclusion (1884) that such a theory is inadequate. He was much impressed with two things, first that exophthalmic goiter in many of its symptoms and signs is the diametric opposite of the known hypothyroid syndrome, and second, that the operative removal of thyroid often materially relieves these symptoms. He concluded therefore that the basic cause of exophthalmic goiter rests upon a pathological alteration in the activity of the thyroid, although he admits that persons with neuropathic natures seem more disposed to the disease. After Möbius we have in 1893 a masterly paper by Friedrich Müller<sup>31</sup> who comes to similar conclusions. Müller, from the pathological point of view, in a series of autopsies, noted the absence of any constant type of nervous system lesion, and also noted the hyperplastic high columnar epithelium of the thyroid. He was also much impressed with the paradox of a loss of weight combined with increased appetite which these patients often show, and inferred that there must be an acceleration of catabolism. In one of his patients he demonstrated an increased rate of nitrogen metabolism. That the thyroid was importantly at fault Müller clearly believed, but he also felt that the nervous phenomena are too impressive for explanation on other grounds than the assumption of organic

central nervous system disease. He therefore concluded that both a neurogenic and thyrogenic factor are necessary for the production of the syndrome. The neurogenic factor, however, he believed to be more closely of the nature of a toxin affecting the nervous system widely, as do lead, alcohol or iodine, than any focal lesion.

Müller's deductions about metabolism were abundantly confirmed by Magnus-Levy<sup>32</sup> whose studies of gas exchange soon showed a physiological antithesis between myxedema and exophthalmic goiter in a characteristic drop in energy metabolism in the former and rise in the latter. Finally, within the last year J. C. Aub<sup>33</sup> at the Massachusetts General Hospital has shown that a similar relation holds true in certain inorganic salt metabolism, that of calcium and phosphorus, both of which show an exchange increase above normal in toxic goiter and a decrease in myxedema.

In view of all this evidence it seems strange that anyone should seriously doubt that an exaggerated action on the part of the thyroid gland plays some important rôle in the production of the syndrome called exophthalmic goiter, and yet that is precisely what C. F. Hoover<sup>34</sup> has done within a month; nay more, he even suggests that in Graves' disease we actually have hypothyroidism! Hoover's philosophy apparently is based upon the fact that Marine found some years ago in goiterous animals an histological picture much like that seen in human Graves' disease, and also in the fact that the goiters found in myxedema and those in Graves' disease may both become smaller under the administration of iodine. This is hardly sufficient to overthrow the hyperthyroid theory of toxic goiter. In the first place, goiter is no essential part of either myxedema or cretinism, and the finding of hyperplasia in certain cretins, instead of proving that such an histological picture of necessity denotes hypofunction, might as well be taken to mean that in these particular cretins there was an attempt at hyperfunction. It might be pertinent to point



out that Uhlenhuth<sup>35</sup> finds a picture similar to Marine's cretins and to human exophthalmic goiter in salamanders at the time of their metamorphosis. He has further shown that thyroidectomized salamander larvae will not metamorphose, but if fed thyroid they will. It is hard to reconcile these facts with any theory other than that at the time of the metamorphosis there is a call for increased thyroid function. I conceive that the hyperplasia in Marine's cretins is due to an attempt on the part of the gland to manufacture thyroxin while lacking a necessary ingredient. This might well lead to hyperplasia, but since the attempt to produce thyroxin is futile, the symptomatology is that of hypothyroidism. In exophthalmic goiter, as Plummer supposes, there may be an intense stimulus or drive upon the thyroid which whips it to overaction and consequently leads to hyperplasia. In this instance thyroxin is produced and the symptoms in part at least are those of an excess in the body of that substance.

Hoover, I believe, has confused the problem because his observations have been made in a highly goiterous district. There is no question but that the natural history of both exophthalmic goiter and myxedema is different in goiterous and non-goiterous regions; in the former the picture is complicated by the added factor of endemic goiter.

I can agree with Hoover that the original cause of exophthalmic goiter is unknown, but I cannot agree that the thyroid is underactive instead of overactive. If his hypothesis is correct, thyroxin should relieve exophthalmic goiter as it does myxedema, but assuredly our experience is that it does not.

The solution, I believe, will most probably come through the experimental production of the disease. Cannon so far as I am aware is the only one who has been at all successful in this direction. His work, although never successfully repeated, since, as Sharpey-Schafer points out, the results were positive, stands as the one bright

spot in the search for the primary cause. It at least shows that a stimulus reaching the thyroid through the vegetative nervous system can give symptoms identical with those produced through thyroid feeding, together with the exophthalmos which cannot so be produced. Whether the thyroid under these circumstances is driven to produce an excess of normal or abnormal thyroxin, who can say? Theoretically it might do either or both, and the work of Cannon therefore, so far as we can determine now, is compatible with the theory of Plummer that in exophthalmic goiter we have not only a hyperthyroidism but a dysthyroidism as well.

As clinicians our aim is to cure our patients. With respect to Graves' disease we must use the best agent we have. Ultimately we shall somehow remove the cause; at present the best we can do is to remove a large portion of the organ responsible for the bulk of the symptoms. Crude as this procedure is from the physiological standpoint, the results, thanks to the remarkable adjusting capacity of the organism, are extraordinarily good.

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# REVIEW OF 4000 ANESTHESIAS IN THYROID SURGERY\*

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THE extension of laboratory examinations and more thorough physical examinations made before operation are a great step toward the individualization of treatment. They represent a movement in the right direction which needs to be still further developed in the best interests of surgery and the patient. We cannot know too much of his physical condition. It furnishes the necessary basis for interpreting the reactions observed during and after operations and renders surgical intervention safer and more definite. The surgical team is rapidly coming to be made up of a group of cooperating specialists whose members are prepared to apply the discoveries of the various medical sciences to the patient at operation.

The surgeon in particular needs to encourage and develop his associates so that they may better perform important functions that he is unable to carry out himself during the operation. The only way to develop the anesthetist into an internist with a surgical "slant" is to increase his responsibilities and to demand more definite answers to the common question: "What is the patient's condition?" Laboratory work and physical examinations lose much of their force if similar and accurate observations are not followed throughout the operation.

Not infrequently circulatory reactions begin on the table, which if neglected when they might be corrected, lead to the death of the patient and to the discredit of surgery. The circulation is a delicately balanced mechanism that reflects the immediate condition of the patient in a most exact manner. A continued study of its reactions

soon convinces the observer of the truth of this statement. The variety of responses is large and it requires experience and study to interpret them; nevertheless every anesthetist should master what seems to me to be one of his most important duties.

To make the work practical and of immediate as well as of later educational value, a graphic record of the pulse rate, the systolic and diastolic blood pressures, and the respiration, and notes regarding the patient should be made during the operation at frequent intervals. Fortunately these observations and records may be made by the anesthetist without much inconvenience. With this information the anesthetist will learn more of the direct effects of his technique and what anesthetics are best. The surgeon also will learn by a review of these records that certain methods of operating under certain conditions are good or bad. In the end, both are benefited, as is also the patient.

In an observation and study of the various anesthetics we have used in a series of 4000 goiter cases extending over a period of ten years, we have observed the following:

## LOCAL ANESTHESIA

The first five hundred odd cases were all done under local anesthesia, a solution of  $\frac{1}{2}$  of 1 per cent novocaine with 8 drops of adrenalin to the ounce being used, with no limit as to the amount of solution used to do the work in a satisfactory manner. The incision of the skin, the cutting of the muscles, the division of the capsule were all accomplished in a satisfactory manner, the drawback to the local technique being that when the gland was elevated from its

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bed and the capsule stripped back, all patients complained of an uncomfortable feeling, a feeling of being strangled, and during this part of the operation they usually became panicky. Those that objected to a local technique at that time were given open drop ether, with its excitement stage, its deep narcosis, its disagreeable nausea and vomiting in the stage of recovery, and its penetrating effect on the operator and his assistants. After completing this series of between five hundred and six hundred cases under local anesthesia, we began to realize that this local technique, while spectacular to the spectators, was seldom appreciated by the patient. Although many times no pain was felt, the physical shock was always bad, the wear and tear on the operator were great and the time consumed was usually twice as long as under general anesthesia.

#### NITROUS OXIDE AND ETHER

Local infiltration and nitrous oxide gas induction with a light ether sequence were now in order. This technique was found very satisfactory for quite a long time, the induction was rapid, the amount of ether used was small, the patient usually left the operating table conscious, and the stage of recovery was seldom more stormy than under local anesthesia.

#### NITROUS OXIDE OXYGEN ANESTHESIA

About five years ago we started using nitrous oxide oxygen anesthesia in all our goiter cases. Its advantages are many: The induction is rapidly accomplished, the patient does not dread the anesthetic, recovery is very prompt, dosage can quickly be regulated to fit the individual patient, the field of operation remains very quiet making it advantageous for the surgeon to do good work, and nerve injury can be easily detected by the change in the respiratory rate and the crowing inspiration that sets in under the light anesthetic. There is no trouble with an excess of mucus, and enough rigidity is always present to keep the tongue from falling back and obstructing respiration.

If during the course of the gas-oxygen anesthesia the manipulations become unusually rough, it takes but a moment to deepen the anesthetic; if the patient temporarily refuses to breathe, 100 per cent oxygen can be given by direct pressure and the patient brought back to a safe level. Recovery is of course very rapid, the patient becoming conscious before leaving the table. The vomiting and retching is reduced to a minimum, making the danger of postoperative hemorrhage almost nil.

Ethylene we have tried and discarded. We saw no advantage over gas and oxygen, but our chief objection was its odor. Everyone connected with our team had a headache from it that persisted all day. The bleeding from the superficial structure of the neck was aggravated in all our cases, due we believe to the excess of oxygen present in the mixture. Cases that showed a tendency to vomit did not recover as promptly from this as they did under straight gas and oxygen, one case in our series vomiting incessantly for three days.

Good judgment in the choice of an anesthetic should be exercised and if the surgeon or anesthetist finds himself confronted with a situation wherein a given agent or agents do not produce the desired effect, the use of other agents should be resorted to unhesitatingly in order that a well-balanced anesthesia may be produced with as little untoward reaction as possible prior to, during and after the operation. The anesthetist should be skilled in using both local and general anesthesia and should not hesitate to give up one type and turn to another as occasion demands. I believe that every goiter operation is facilitated by the use of a gas and oxygen anesthetic properly administered.

The thing the patient appreciates most in being given this anesthetic is to be "blown asleep." Never hold the mask down on the face while inducing the anesthetic; for this point I have to acknowledge my indebtedness to members of the dental profession. They blow the gas into the patient and the latter does not experience

that choking sensation so common when the face mask is held firmly on the face when beginning the anesthetic.

During this anesthesia the anesthetist should attempt to keep the patient asleep and his color natural, as pink as possible, whether he is soundly asleep or not. A vicious cycle is easily established by continued cyanosis, wherein respiration becomes insufficient, the blood becomes blue or black and the pulse becomes weaker and weaker because of the progressive decrease in the available oxygen. Lack of oxygen depresses the circulation, and deficient circulation diminishes oxidation. Ultimately the point is reached where circulation is insufficient to aerate the tissues even when pure oxygen is administered. When general anesthesia is superimposed on the foundation provided by preliminary hypnotics and local anesthetics, it should not be carried to the point where the patient's natural color changes.

#### CIRCULATORY DISTURBANCES

About 70 per cent of all goiter cases presenting themselves for operation come in because of urgent symptoms referable to the circulation or respiration. Cardiac arrhythmias are present in many cases. Practically all thyroid cases have a tendency to cyanosis and respiratory obstruction during some part of the operation. This may be due to the size or position of the gland or to the strained position of the shoulders on the sand bag, throwing the head too far back; obstruction in the mouth or throat must always be thought of. The anesthetist should know the circulatory conditions of the patient at all times.

The pulse and blood-pressure ratios and reactions are prerequisite for the interpretation of the circulation. Cardiac arrhythmias affecting the rate are readily detected in the pulse. The functional types often disappear during a carefully conducted narcosis. The circulation in these cases is usually good, but sometimes improves. The organic types either do not improve or are made worse.

Pulsus alternans, which is an arrhythmia not necessarily of rate but of weak and strong heart contractions characterized by alternating small and large pulse pressures, is not only readily detected with the sphygmomanometer but is subject to actual measurement. Arrhythmias, particularly of this type, require close watching because a serious impairment of the muscular organisms of the heart, which has lost the capacity to respond with maximum contraction to every stimulus; the contracting capacity is diminished. Pulsus alternans is second in frequency of the cardiac arrhythmias and of particular importance in surgery of the thyroid as indicating myocardial defects.

The patient may show no arrhythmia before operation but under the stress of surgery, pulsus alternans occasionally develops, showing that the heart muscle is unable to respond adequately to the extra labor. It is encountered more frequently in hypertension, arteriosclerosis, myocarditis and nephritis. These cases promptly succumb to a fall in blood pressures and increased pulse rate.

If the condition is recognized before operation, digitalis is indicated even though the pulse rate is not rapid. When it develops during operation, some digitalis preparation should be administered intravenously. The operation should proceed with the minimum of trauma under the lightest possible narcosis. Morphine in sufficient dosage to produce its physiological effects is desirable, preferably before operation. It may also be used with good results during the thyroidectomy.

Myocardial defects are more serious than compensated valvular disease of the heart. The crux of the matter is whether or not the circulatory mechanism is able to maintain a proper distribution of blood without cardiac exhaustion during the relatively short period of surgical intervention. A study of the case at the moment will show how far we may go with a thyroidectomy. If the case is borderline before beginning the operation, the test of surgery

only will tell how the circulation may react. Patients with valvular defects which are grossly complicated with myocardial weakness require most careful anesthesia and surgery to avoid disaster. All valvular cases may be regarded with suspicion until the test of surgery shows the heart muscle to contain the essential reserve power to compensate for any ordinary disturbance of blood distribution.

#### SUMMARY OF CASES

In the ten years that we have been performing thyroidectomies we have dealt with every conceivable type of patient from a patient aged seventy-one to a child of eleven years. Every type of goiter has been attacked, including six previously diagnosed malignant glands. We have frequently ligated the superior thyroid artery, and for a time favored ligation of the inferior thyroid artery. Lobectomy has been practiced in some very severe cases, with the removal of the remaining lobe on the following day.

In these thousands of cases I have seen but one death upon the table and that from an injury to the jugular vein which was adherent to the thyroid capsule, death being due to an embolism. I have seen one case anesthetized three times in a period

of two hours for hemorrhage, with no bad results. I have seen but two cases of nerve injury. I am not familiar with tracheal collapse, having seen no such cases.

#### CONCLUSIONS

Gas and oxygen with proper preliminary medication is the anesthetic of choice in thyroidectomy, although it is the most difficult to administer.

For the success of our cases, we must have a definite surgical team. The first assistant must know the operator's every move. The surgeon must have unbounded confidence in his assistants. He must consult his anesthetist as to the advisability of doing a complete or incomplete operation in one stage, whether or not it will be safe to close the neck after operation or whether it should be left open for twenty-four to thirty-six hours.

The anesthetist must be quick to recognize changes in the respiratory rate, the pulse rate, the color signs; he must know the condition of the heart before and during operation. He must warn the surgeon of any manipulations that are endangering the patient. When this team works together as a unit for the patient's welfare, we can then and then alone hope to be very successful in our thyroid cases.



# TREATMENT IN ACUTE MECHANICAL INTESTINAL OBSTRUCTION\*

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IN a consideration of the treatment of acute intestinal obstruction one must bring to the fore the salient fact that at present the death-rate in the intermediary and late cases of this condition ranges from 30 per cent to 60 per cent, whereas with early diagnosis and operation the mortality compares favorably with that of other acute surgical conditions.

There are two main reasons for this. The first rests with the laity and is, at present, excusable, for their understanding of intestinal cramps, vomiting and constipation is not that of an intestinal obstruction, and therefore immediate medical aid is not always sought. The significance of the given symptoms will not be appreciated by the public until this is brought forcibly to its attention. The second reason rests with the physician, who should ever be alert in the interpretation of these symptoms and their grave import.

In this connection Deaver<sup>1</sup> states: "Why is the present death-rate 50 per cent instead of 10 per cent? The answer is: early diagnosis has not been made. And why has an early diagnosis not been made? Because the naked abdomen has not been carefully scrutinized and carefully auscultated and palpated, including examination per rectum and per vaginam."

The course of treatment outlined in this paper is based upon 137 cases admitted to Harlem Hospital, and upon animal experimentation. No discussion will be made of experimental investigation into the nature of the toxemia; only that part of the experimental problem will be alluded to

which has a distinct bearing on the clinical treatment and has therein proved of value.

In a previous communication<sup>2</sup> clinical mechanical intestinal obstruction was divided into two types (Figs. 1 and 2), based on animal experimentation. Wilkie,<sup>3</sup> in his observations upon appendicitis, calls attention to the acute appendicitis and the acute appendicular obstruction. The latter corresponds to Type 2, segmental intestinal obstruction.

Type 1 and Type 2 clinical mechanical obstruction can be further classified as early, intermediate and late. This classification has no reference to units of time alone. The terms used are based on a consideration of the type of obstruction, the location in reference to the duodenum, the number of hours the obstruction has existed and, in Type 2, the size of the involved loop or segment and the condition of the circulation. All these factors must be considered together.<sup>4</sup> To illustrate: a simple Type 1 obstruction at the rectum is early a week after onset, whereas a similar obstruction at the jejunum within twenty-four to forty-eight hours becomes late. A Type 2 obstruction, volvulus of the sigmoid, is early only for several hours after onset, and is late within twenty-four to forty-eight hours, while a Type 1 obstruction of the sigmoid would be early for days after the onset. Usually the obstruction cannot be clinically classified before operation, therefore a prognosis should always be guarded until celiotomy has established the above factors.

Experimentally, the treatment is very

\* From the Surgical Service, Harlem Hospital, and the Department of Experimental Surgery, New York University and Bellevue Hospital Medical College, New York. Read before the Harlem Medical Society, December 1, 1926.



definite, and a detailed plan can be outlined in each animal, depending upon the type and duration of the obstruction. In simple or Type 1 obstruction and segmental or Type 2 obstruction, before a severe toxemia exists, removal of the obstructing agent and reestablishment of the continuity of the canal, is all that is required, regardless of the location of the

per cent mortality in the late cases, an additional technical procedure may be considered, and for this an enterostomy can be utilized. Experimentally, it is not successful.

If the contents of the duodenum and oral jejunum are permitted to escape externally, in normal animals, death occurs within the same number of hours as when there is an

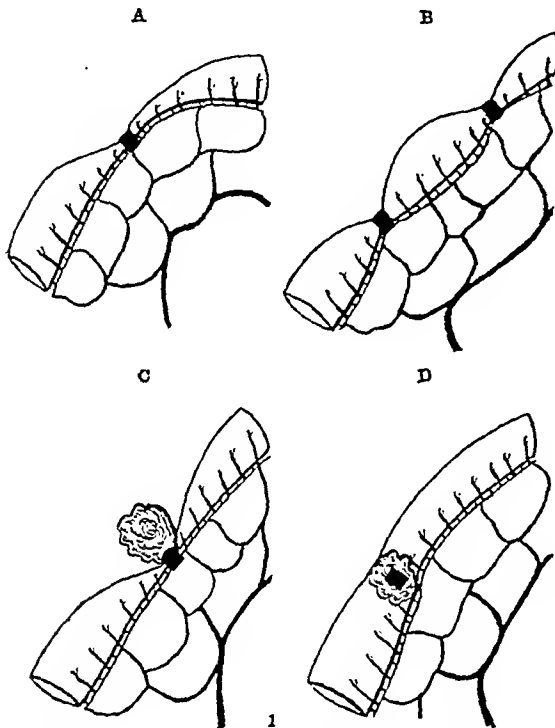


FIG. 1. Type 1 obstructions (diagrammatic): A. Occlusion by bands or adhesions; B. Double occlusion by bands or adhesions; C. Occlusion by pressure of tumor from without; D. Occlusion by tumor within the intestinal canal. There is no interference with the mesenteric circulation in this type of case. The black oblong indicates the site of occlusion of the canal.

obstruction. There is no mortality in either instance as the result of the obstruction.

In the intermediate case of obstruction, if both types are treated in the same way as described above, the mortality becomes positive, but by far the large majority of animals recover. If the same treatment is carried out in the late cases, where a severe toxemia exists, death is inevitable in both types. Since there is a slight mortality in the intermediate cases and a 100

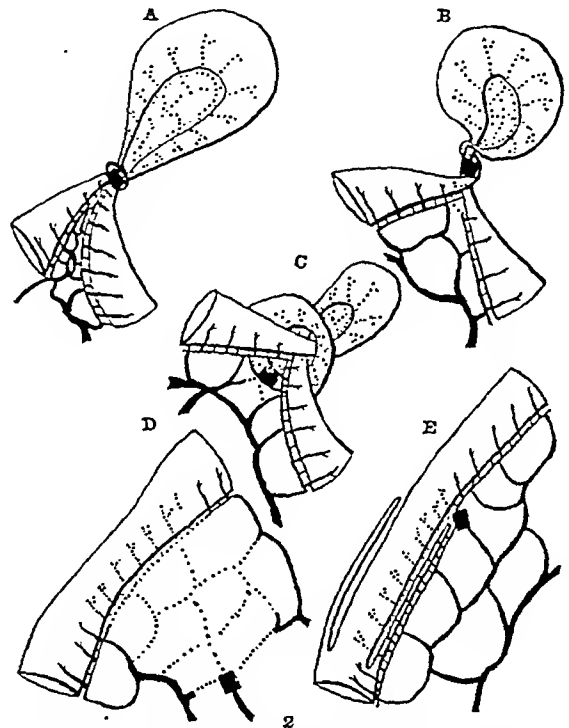


FIG. 2. Type 2 obstructions (diagrammatic): A. Loop; B. Volvulus; C. Knotted bowel (double occlusion of canal with interference in the mesenteric circulation); D. Mesenteric thrombosis; E. Intussusception (here the block of the circulation acts practically as an occlusion of the lumen of the canal). The black oblong indicates the interference in the mesenteric circulation and occlusion of the canal in A, B, C, and interference with the mesenteric circulation only in D, E. Dotted lines indicate absence of circulation.

obstruction at these points. To be compatible with life jejunal drainage must be at least 60 cm. from the duodenojejunal ligament. In the low ileum and colon, enterostomy and colostomy do not produce any marked deleterious effects on the animal.<sup>5</sup>

In later observations<sup>6</sup> made upon high duodenal and high jejunal obstructions that were drained twenty-four hours after

the obstructions, the animals died sooner than those with obstructions alone or fistulae alone. The coincident toxemia was more grave. The results of the experiments of Orr and Haden<sup>7</sup> are similar, and they showed, in addition, that the findings in the blood in these cases of fistulae are similar to those in high obstruction. In their conclusions they state: "With the well-known danger of duodenal fistula and the rapid death of animals following experimental jejunostomy in mind, we believe that the clinical value of jejunal drainage for obstruction of the small intestine is yet to be proved."

The employment of jejunostomy is contraindicated in both types of obstruction, regardless of whether the case is early, intermediate or late. After the obstructing agent is removed, a toxemia still exists, and why intestinal drainage is of value must necessarily be questioned. Lower down in the intestine, where the enterostomy itself is not fatal, the beneficial results obtained can be explained by the fact that the reconstruction operation was omitted, which in itself adds more shock to an already prostrated animal. Here, however, an enterostomy or colostomy is of no value if the toxemia has already advanced far. One must not lose sight of the fact that if the animal should recover, there still remains the repair of the fecal fistula, which has a hazard of its own.

A closed intestinal tract at the end of the operation in either type of obstruction after removal of the causative agent is desirable. However, this is not always feasible and a partial or divided operation may be resorted to in very toxic animals. Here the gangrenous loop is placed upon the abdomen without resection and oral enteric drainage. This is a rational procedure, for a gangrenous loop of gut if placed outside of the abdominal cavity in itself produces no ill-effects upon the animal. An uneventful recovery results if the continuity of the canal be reestablished.

The administration of large quantities of fluids under the skin and into the veins is

more reliable than when given through the jejunal catheter or enterostomy.

Connors and others<sup>8</sup> have definitely shown the presence of an acidosis as indicated by changes in the carbon dioxide combining power, and where there is an accumulation of the nitrogenous waste products, they follow the order of retention presumably characteristic of renal impairment. Haden and Orr<sup>9</sup> have shown a fall of the blood chlorides and have administered a physiological solution of sodium chloride with beneficial results. McQuarrie and Whipple<sup>10</sup> have demonstrated an impaired kidney function. Zeman and others<sup>11</sup> and Brown and others<sup>12</sup> have demonstrated definite kidney changes, both clinically and experimentally.

The free administration of water by the various methods undoubtedly prolongs the life of the obstructed animal, as shown by Hartwell and Hoguet,<sup>13</sup> and Draper,<sup>14</sup> hence fluids should always be forced to the maximum, not only as a diluent of the toxin or toxins, but also because of impaired kidney function.

This brief résumé of the experimental side of the problem has been emphasized because of its direct application to the clinical case.

All cases of suspected or positively diagnosed obstruction, when admitted to the hospital, should be considered urgent. Although operation is the most important consideration in the treatment of obstruction, many cases have been lost through the lack of proper preoperative and post-operative care. The longer the obstruction has existed, the more important is the diligent care of these patients.

An enema is given as soon as possible. One must not be misled by a return of feces, for this may be the remains of the fecal contents below the obstruction. Many cases have been held over for several hours before operation was decided upon, owing to the results of this enema and the temporary relief it very often affords. Another enema should be given in an hour or sooner if the diagnosis is not positive. Gastric

lavage is indicated in all intermediate and late cases, and should be used diagnostically in questionable cases, where it is often repeated. In those cases in which the toxemia predominates, saline solution should be given by hypodermatoclysis or infusion before operation.

Specimens of blood for chemical analysis, and of urine for routine examination, and especially for indican and phenol, are sent to the laboratory. These examinations should be made every few hours, for they are of great value in establishing a diagnosis in questionable cases, and if specimens are taken repeatedly, preoperatively and postoperatively, they are of considerable aid in determining the prognosis or indicating the necessity of a secondary operation.

A general anesthetic may be employed in all early cases. In late cases, local anesthesia is the one of choice. If extensive exploration is required, general narcosis is usually added, because a rapid thorough exploration of the abdomen with distended gut is almost impossible under local anesthesia. All cases should receive a gastric lavage just before operation, because, in several instances, death has been caused by aspiration of the vomitus. In those cases in which the toxemia predominates it is preferable to operate upon the patient in bed, as the moving from bed to stretcher, to operating table, back to stretcher, and then to bed, materially exhausts an already prostrated patient.

After several hours of careful clinical study and medical treatment, all doubtful cases with a history of intermittent or constant cramp-like abdominal pains, vomiting and obstipation, should be subjected to a rapid exploratory celiotomy. This constitutes good surgical judgment, as the operation entails no additional risk. When one procrastinates, and the case proves to be an intestinal obstruction, the coincident toxemia may prove fatal, despite the surgical interference. The exploratory operation has, time and again, been strongly advocated by many surgeons.

In those cases where a positive diagnosis of obstruction is made, operation is to be performed as soon as possible. The speed of the operation must be considered. In the majority of surgical conditions speed is not paramount, but here it is of the utmost importance, especially if the patient is subjected to a general anesthetic.

Upon opening the abdomen, the presence or absence of fluid is of aid in determining the correct operative procedure. A small amount of serous fluid is occasionally present in Type 1 or simple obstruction, but it occurs late and is probably the result of intra-enteric pressure above the obstruction. If it is not present in segmental or loop obstruction, Type 2, its absence signifies either that the operation was performed early, before definite circulatory changes occurred, or that there was no obstruction of the mesenteric circulation, as in a two-band simple or Type 1 (Fig. 1, B) obstruction. The fluid and its character, if present, designate various degrees of devitalization. Serous fluid indicates that the gut is viable and that the circulation will return. Serosanguineous fluid occurring early, based on the history of the case, indicates that the gut is viable; later the question of resection must be considered, although the gut may be returned to the peritoneal cavity, and a return of the circulation may occur. Sanguineous fluid makes resection almost imperative. Sanguinopurulent fluid indicates one thing, gangrene, in which there is no hope for the return of the circulation.

In early cases of Type 1 and 2, all that is required is the removal of the obstructing agent. No mortality occurs as the result of the obstruction, as there is little or no toxemia.

In the intermediary and late cases, in Type 1, the seriousness of the obstruction depends upon its proximity to the duodenum and the number of hours it has lasted. In addition to the removal of the obstructing agent, an enterostomy may be considered. The value of this procedure is referred to later.

In the intermediate cases in Type 2, resection must be considered. The all-important factor is the questionable viability of the presenting loop, which the surgeon must judge. If there is any doubt, resection is indicated. In some instances the circulation in the involved segment or loop has apparently returned sufficiently to warrant its replacement into the peritoneal cavity. On the other hand, where the return circulation is sluggish, great care must be exercised before the segment is considered viable. For the gut to be sufficiently viable to obviate a resection, there must be a rapid return of the circulation, as manifested by color and luster, after the obstructing agent has been removed. Although the segment may be edematous, there should be no line of demarcation of color. On palpation, the pulsation of the mesenteric arteries is essential, as well as the pulsation of the terminal arches, and the vasa-recta at the mesenteric border of the intestine. Special attention should be paid to those vessels located in the central portion of the involved segment; if there are marked arterial changes, resection becomes almost a necessity. The size of the involved segment must also be taken into consideration.<sup>15</sup> If resection is decided upon it should be performed with immediate reconstruction of the canal.

If, for any reason, the patient is considered a poor surgical risk, the questionable segment can be delivered upon the abdomen and a tube inserted in the normal oral gut. In this instance, the segment is later resected. Reconstruction of the bowel at the time of resection depends upon the condition of the patient and the proximity of the involved gut to the duodenum. After the decision is made to leave the segment upon the abdomen, it is not done with the idea that the circulation will return to it.

When the viability of the gut is at all questionable, allowing it to remain in the peritoneal cavity, with the idea that it is just as safe to resect within twenty-four hours or more, is to be condemned, for the

reason that within these twenty-four hours, if the circulation does not return to the segment, a fatal toxemia may result despite a secondary operation. Although it has been shown that the circulation did return in some instances, on the other hand in numerous instances it did not return, as proved by autopsy.<sup>4</sup>

In the late cases of Type 2, when gangrenous gut is present, resection is indicated; if the patient's general condition is poor, the involved segment is placed upon the abdomen with a tube in the normal oral gut, as in the intermediate cases with complications, just described. From personal observations and those cited in the literature, this type of case terminates fatally in the large majority of instances, regardless of the operative procedure, as the result of the toxemia.

When there is gangrenous gut or gut of questionable viability which may become gangrenous, even if the patient is in a serious condition, it should be removed from the peritoneal cavity. To grasp the first presenting piece of intestine and perform a jejunostomy or enterostomy alone is not a good surgical procedure, because a toxic absorption occurs from these affected segments or loops and produces a fatal toxemia despite simple enteric drainage.

Jejunostomy and enterostomy in any type of obstruction have not proved satisfactory procedures in this series of cases. However, many favorable results have been reported. Surely in the early and intermediate cases it has no place outside of the exception mentioned above, in connection with complications in cases where the viability of the gut is questioned. In the late cases it has proved futile.

If peristalsis does not return, drainage by enterostomy is segmental only. If peristalsis is reestablished, the flow of feces does not stop at the enterostomy tube; part of the intestinal contents passes by the tube and is later expelled by the rectum. Therefore, enterostomy is of little or no value as a means of drainage. In numerous instances spontaneous closure

of the intestinal fistula does not occur and a secondary operation is required. The introduction of fluids through the enterostomy tube has not met with favorable results. Fluids in large quantities, which are so essential in the treatment of this disease, can be given more efficaciously under the skin or into the veins. Many times a fatality results before the closure is attempted. When employed in markedly distended gut, as in paralytic ileus, it acts only as a segmental drainage, that is, only a very small part of the bowel is really drained. The resultant decrease in intra-enteric pressure may bring about a return of peristalsis, but the same effect can be obtained by gastric lavage, enema and medication. Enterotomy, on the other hand, may drain the bowel sufficiently to reduce the intra-enteric pressure and likewise stimulate peristalsis. The advantage with this method is that no secondary repair is required. If a jejunostomy or enterostomy is decided upon, the technique of McKenna<sup>16</sup> for the former and that of Mayo<sup>17</sup> for the latter are very satisfactory.

The removal of the toxic material from the intestine is of negative value, because, when an enterostomy is really indicated, an overwhelming blood intoxication is present. Furthermore, high drainage adds to the starvation and dehydration of the patient. From all the evidence gathered, the closed intestinal tract offers the best results, if it is feasible.

The various operative procedures in fatal cases can be criticised on two grounds: either too much or too little is done. Those cases in which too much is done are the cases that are very toxic and in which the resection of gut is performed with an immediate reconstruction operation and an enterostomy. Here no time must be lost in determining what to do, as time is one of the most important factors. One must enter the abdomen quickly and get out quickly; in extreme cases all that is required is to deliver the devitalized segment upon the abdomen and introduce a tube through the normal oral end. When

numerous bands and adhesions are present, without circulatory changes in severe toxemias, one must determine as rapidly as possible which is the obstructing band and release it. We must not attempt to remove all other adhesions. We must avoid too careful toilet of the raw surfaces in these extreme cases.

Too little is done in cases where all of the actual obstructing bands have not been removed. Allowing the questionable gut to be returned to the peritoneal cavity with the idea of reoperating in twenty-four hours if the patient does not do well, is to be condemned on the ground that if the circulation does not return, this twenty-four hour interval is sufficient to produce a fatal toxemia. Certainly, too little is done where the first presenting loop of intestine has been grasped and a tube is inserted, and no attempt is made to ascertain the type of obstruction.

One of the most difficult decisions to be made, after a primary operation for obstruction has been performed, is when to reopen the abdomen. The indications for reoperation are the symptoms and signs of another obstruction, or evidence that the first operation was not complete. Obstruction, on the other hand, may follow operations of any sort, such as that due to a loop of gut caught in a uterine suspension operation, or an inflammatory band following the removal of a ruptured appendix. Again, a postoperative paralytic ileus may occur in any instance, without a mechanical obstruction. Here, time and again, the ingenuity and diagnostic acumen of the surgeon are severely taxed. The solution of the problem is: when in doubt, operate.

The postoperative treatment of intestinal obstruction is extremely important, and it begins as soon as the patient leaves the operating table. Twenty-four to forty-eight hours after the operation is entirely too late for the inception of postoperative therapeusis.

Dilution of the toxin or toxins, and elimination through an impaired kidney

and intestine are the only means of coping with the toxemia. This dilution and elimination are secured by the copious administration of saline solution by hypodermatoclysis and by infusion and, if possible, of fluids by mouth and rectum. For the concomitant acidosis, glucose solutions are administered subcutaneously and intravenously.

Removal by phlebotomy of sixteen to eighteen ounces of blood and its immediate replacement by fluid are indicated in late cases. Resort early to stimulation with pituitrin. Gastric lavage and high colonic irrigations are to be practiced early and frequently, unless a reconstruction operation has been performed. After gastric lavage, 2 ounces of hot magnesium sulphate solution, or 1 ounce of castor oil should be placed in the stomach as soon as the patient recovers from the anesthesia. However, with resection and reconstruction of the intestine, if the indication arises, gastric lavage and enemas can be administered with safety after a lapse of twenty-four hours.

#### ANALYSIS OF CASES

Forty-one personally operated cases have been studied. There were 13 cases of occlusion of the lumen of the canal (Type 1), 11 of which were the result of bands and adhesions, the remaining 2 due to carcinoma. Twenty-six cases were of Type 2 and showed, in addition to the occlusion of the lumen of the canal, interference with the mesenteric circulation. Of these cases there were 9 femoral hernias, 5 inguinal hernias, 1 ventral hernia, 1 umbilical hernia, 1 volvulus of the sigmoid, 1 intussusception, 8 loops of bowel caught by bands and adhesions. The remaining 2 cases were diagnosed as mechanical obstructions, but proved to be instances of paralytic ileus.

The following operative procedures were carried out in these cases: In the 13 Type 1 cases, bands and adhesions were cut in 11 cases, without other operative procedures. In the 2 remaining cases of carcinoma, the

tumor was placed upon the abdomen with enteric drainage, immediate in one; subsequent in the other; resection of the tumor was performed a few days later; in one of these cases a subsequent reconstruction operation was performed, the second died before this could be attempted.

Of the 26 cases of Type 2 obstruction, the cutting of a constricting hernial ring was performed in 16 cases. In the 8 cases where loops of gut were caught between bands or adhesions, the constricting bands were cut. In 4 of these cases the following additional procedures were carried out: In 1 case a resection, with immediate reconstruction of the canal; in 2 cases resection with oral drainage, without immediate reconstruction; in the remaining case the gangrenous loop was left upon the abdomen with oral drainage. The last 3 cases died before a reconstruction operation was possible. In the case of intussusception it was manually reduced. In the volvulus case the loop was placed upon the abdomen with oral enteric drainage; later the loop was resected and, several months after, reconstruction of the canal was performed. In the 2 cases of mistaken diagnosis (paralytic ileus) cecostomy was done upon one and enterotomy on the other; the former required a secondary operation for closure of the fecal fistula.

There were 12 deaths in this series. Of the 13 cases in Type 1, there were 4 deaths, 2 early, 1 intermediate and 1 late. The first developed an uncontrollable diarrhea, and the patient died three weeks after operation. The second case was one of carcinoma of the large intestine and the patient died three weeks after operation, before closure of the colostomy. The third was one of carcinoma of the ascending colon, and died of cachexia four weeks after operation. The fourth case had an associated pelvic abscess, and death resulted from a generalized peritonitis, seven days after operation. In these 4 cases, in no instance was the death directly due to the obstruction toxemia.

Of the 26 cases of Type 2, there were no deaths in the early cases; in the intermediate class, 2 deaths occurred. The first was that of an intussusception, in which the involved segment, of questionable viability, was allowed to remain in the peritoneal cavity. The patient developed a post-operative bronchopneumonia. At autopsy, the segment was found to be devitalized. In the second case a loop of gut caught between two bands was released, and although of questionable viability, a resection was done and a jejunostomy performed. The patient died five days after operation, with evidence of an obstruction toxemia. There were 6 deaths in the late cases. The first was a strangulated hernia; the patient suddenly died on the fifth day after making an apparently uneventful recovery. A patient who had volvulus of the sigmoid died six months after the primary operation, with a general peritonitis due to leakage at the site of the reconstruction operation at this time. The remaining 4 cases all died as the result of the obstruction toxemia.

I am indebted to Dr. J. F. Connors, Surgical Director, Harlem Hospital, for the opportunity to study clinical intestinal obstruction during the past nine years.

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# THE SECONDARY RÔLE PLAYED BY MICROORGANISMS IN THE CAUSATION OF INFLAMMATORY CONDITIONS OF THE DIGESTIVE ORGANS

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THE infectious nature of the pathogenesis of the so-called inflammatory conditions of the digestive organs, such as gastric and duodenal ulcers, cholecystitis and cholelithiasis, pancreatitis, chronic and acute appendicitis, etc., is accepted by the medical profession. I aim to demonstrate that the infectious theory is wrong, because microorganisms play only a secondary rôle, while the primary causes (as to time and importance) are malformation and malposition of the immediately affected or neighboring organs, existent before microorganisms could affect them.

By malposition and malformation I mean conditions that differ from the normal, not stating, however, that in every case where these abnormal conditions are present gross pathological change must follow.

Malformation and malposition may occur in any portion of the gastrointestinal tract, but whereas in some parts they might cause little or no disturbances, in others they cause slow or rapid damage. Practically all the pathological changes in the digestive organs are observed at three points: first in the right upper abdominal quadrant, which includes the pylorus, first and second portion of the duodenum, portal vein, hepatic artery, hepatic, cystic and common ducts, gall bladder and adjacent portions of the liver, the pancreas, the lesser omentum; second, in the region of the cecum, including the appendix and the ileocecal valve; third, at the sigmoid.

The malformations and malpositions to be studied are the following: In the first region the lesser omentum and a portion of the transverse mesocolon become fused

together, during fetal life. In the second region appendices become kinked with short mesentery or are misplaced during fetal life. In the third region the descending colon, the sigmoid especially, is greatly distended, dilated and elongated. We may add that other portions of the gastrointestinal tract may become distended, elongated and adherent. I shall not here discuss such abnormalities as Jackson's membranes, Harris' band, Lane's kinks, etc., nor faulty rotation of the colon, which, however, are obviously included in the terms malformations or malpositions.

My study of still-born infants leads one to believe that the main factors causing the malformations and malpositions mentioned above are: (1) the presence of meconium in the colon; (2) the position of the fetus in utero. These two factors cause the formation of those adhesions, kinks and deformations of the digestive organs that are observed later at operation or autopsy and that are attributed to infectious processes. The infectious processes are a factor in the causation of the lesions observed later in life only because of the faulty anatomical structure, which favors stasis and stagnation and consequent growth of microorganisms and their infiltration in the tissues. Microorganisms would very seldom cause any pathological change in the digestive organs if the faulty anatomical structure was not present. To illustrate and make plainer this assertion we may compare a normal mouth to a normal digestive system and a cleft palate to an anatomically faulty digestive system. Microorganisms are present in all, but

whereas in the normal mouth their presence is harmless, in cleft palate they do cause local and general lesions. Would anyone state that the presence of microorganisms in a mouth anatomically faulty, as in cleft palate, is the primary cause of the local and general pathological processes observed in cleft cases? Obviously the primary cause is the faulty construction of the mouth. The same must be stated of the pathology of the digestive organs. Practically all kinks and adhesions precede the

confirm the points of view and the facts brought forward in this paper.

In a still-born child the liver is seen to occupy the whole upper abdominal region. The division between the right and left lobes is located in the middle of the abdomen and is marked by a deep incisura. In about 6 cases out of 10 the transverse colon appears in the abdomen only from this incisura up to the splenic flexure. The right portion of the transverse colon is not seen. It seems to crawl under the

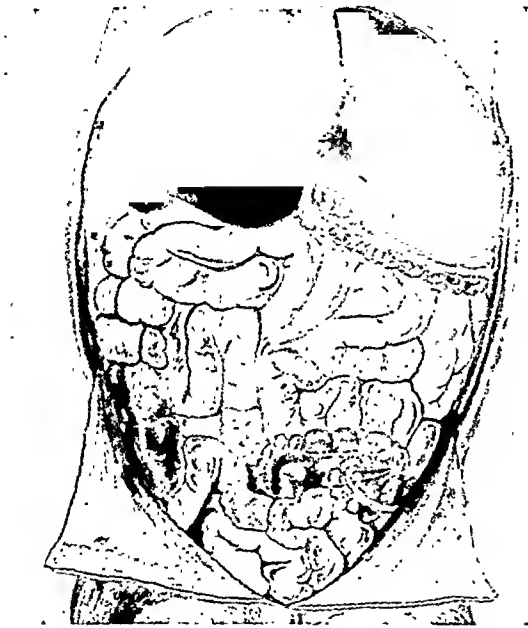


FIG. 1. Common appearance of the abdomen in the still-born. Note the transverse colon disappearing under the right lobe of the liver, taking the course schematically outlined in Figure 2.

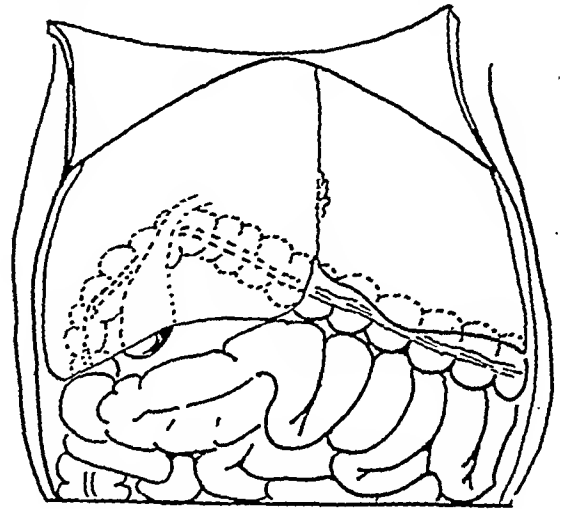


FIG. 2. Schematic drawing of relations in the upper abdomen of the still-born.

inflammatory stage, which is thought to be due to microorganisms and which may lead to ulceration, perforation or degeneration of the affected or neighboring organs. In order to demonstrate that this assertion is correct I must prove that the conditions observed at operation or at autopsy exist before microorganisms can possibly have any effect on the organs. We must, therefore, study the digestive organs of normal still-born infants, in whom the digestive organs are sterile. At this time only about 60 still-born infants have been studied, but continued daily observations

confirm the points of view and the facts brought forward in this paper. In a still-born child the liver is seen to occupy the whole upper abdominal region. The division between the right and left lobes is located in the middle of the abdomen and is marked by a deep incisura. In about 6 cases out of 10 the transverse colon appears in the abdomen only from this incisura up to the splenic flexure. The right portion of the transverse colon is not seen. It seems to crawl under the liver between the right and left lobe as shown in Figures 1 and 2. If the right lobe of the liver is raised the course of the right portion of the transverse colon is plainly seen. It takes an upward course to the under surface of the liver and then bends towards the pelvis to form the descending colon. I would emphasize the enormous importance of the direction taken by the right portion of the transverse colon, while hidden under the liver. Of great importance also is the position of the stomach. It presents itself crowded under the liver as an exceedingly narrow, almost straight tube, not resembling in any manner the stomach of extrauterine life. The great omentum is practically never found distended over the abdomen as in adult life. It is folded over the transverse colon and is

extremely thin and fragile. The right portion of the transverse colon, hidden under the liver, in reaching the upper point in its upward course comes in immediate contact with the gall bladder, the cystic duct, the portal vein, the hepatic artery, the lesser omentum, the first and part of the second portion of the duodenum and the pylorus.

This condition is observed only in the still-born; changes occur in the baby who has lived even only a few hours. The

transverse colon as described above is exceedingly great for the following reasons: in normal conditions the lesser omentum and the mesocolon of the right portion of the transverse colon are two distinct structures. In some cases, however, they become fused together and this fusion prevents the corresponding portion of the colon from descending as in normal conditions. The greater omentum may also become adherent here and there and cause malformations and malpositions.

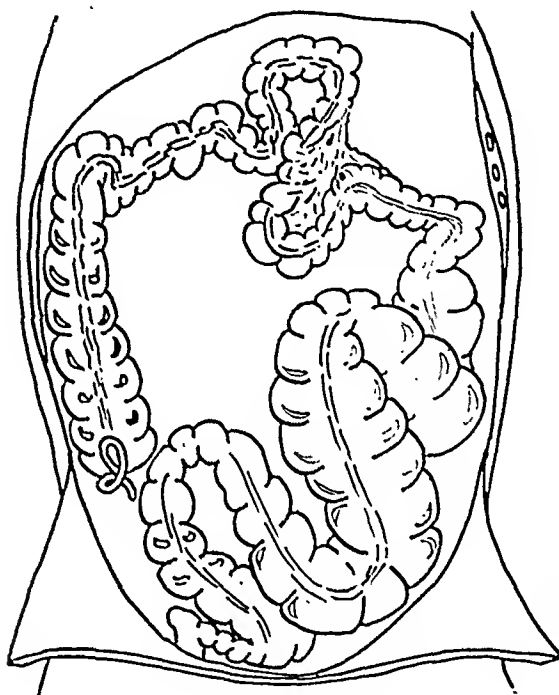


FIG. 3. Numerous kinks and adhesions in the still-born. Note the kinked appendix in immediate contact with a loop of the sigmoid, which is shown to be immensely distended, elongated and kinked by a large quantity of meconium. Note adhesions and kinks in the transverse colon.

stomach dilates and pushes downward and to the right that portion of the right transverse colon that was in contact with it. The uppermost point of the transverse colon, which was practically wedged between the gall bladder and the second portion of the duodenum, is also pushed down by the second portion of the duodenum itself, which becomes dilated. The right transverse colon, which was hidden under the liver, descends and becomes evident in the abdomen. The importance of the position of the right portion of the

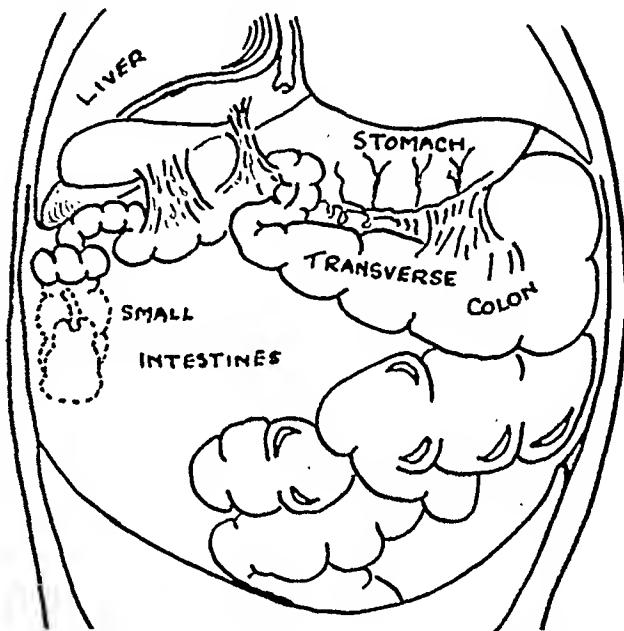


FIG. 4. Another still-born infant. Showing numerous adhesions and kinks. The transverse colon is adherent to the liver, gall bladder and stomach; on the left the transverse colon is greatly distended by meconium, while on the right it is markedly contracted and kinked. The appendix, retrocecal and ascending colon are shown in dotted lines.

What is the result of the fusion of the mesocolon and the lesser omentum? In the erect position the result is a continuous more or less severe pulling on the lesser omentum and consequently on the pylorus, first and second portions of the duodenum, portal vein, pancreas, the hepatic, cystic and common ducts, and the gall bladder; continuous mutual interference of function of these organs during digestion, when the colon is filled, creating conditions of stasis, interference with lymphatic and blood circulation, and consequently favoring the growth and action of microorgan-



barium enema reveal a normal rectum, marked redundancy of the sigmoid, kinking in the mid-descending colon, and spasticity of the transverse colon. Near the hepatic flexure there is marked angulation and the hepatic flexure recedes into the posterior plane. There is slight ileo-cecal leakage."

At operation: the gall bladder was found normal, but there was very marked fusion of the mesocolon and the lesser omentum, which interfered with the emptying of the cystic and common ducts; the appendix was slightly kinked but normal; the transverse

Stereoscopic roentgen-ray pictures show that the colon recedes into a posterior plane. At operation it is found that the mesocolon and lesser omentum are fused together. This fusion, however, is not easily appreciated and only a trained eye will notice it and a trained hand will be able to free the adherent structures properly. The fusion of the mesocolon with the lesser omentum explains also the condition shown in Figure 7. On the right the colon takes a v-shaped form because there is a



FIG. 6. Case II.

colon from the point that was fixed to the lesser omentum to the hepatic flexure formed a loop about 10 cm. long, kinked upon itself. The patient, who had always been constipated, has had normal movements since the fifth day following the operation. Digestive troubles completely disappeared.

CASE III. S. R., male, aged thirty-eight years. The patient was always constipated and dyspeptic. Appendix had been removed about eight years previously. At operation it was found that the transverse colon was adherent to the pylorus, with fused mesocolon.



FIG. 7. Case III.

long loop between the point of fusion and the suspensory ligament of the hepatic flexure. This condition I have met five times at operation, and four times at autopsy: twice in adults, once in a child two weeks old, once in a still-born infant.

In this paper I shall only mention the condition of the appendix in the still-born. Four out of 10 show kinks of the appendix, with adhesions, and short mesenteries, exactly as observed at operation or at autopsy. This fact also proves the contention that these kinks and adhesions precede the infectious processes that call for operation. Contrary to the accepted

opinion, the *causa prima* of acute and chronic appendicitis is an anatomical defect, that is, congenital kinks and adhesions, not microorganisms.

In clinical observations I have noticed that patients suffering from digestive disturbances present the following triad: fusion of mesocolon and lesser omentum, kinked or adherent appendix, long sigmoid. This triad exists in the still-born; 4 out of 10 have an exceedingly long and dilated sigmoid. On the importance of this condition I am collecting material to be published later. (Also see illustrations.)

### CONCLUSIONS

I have described anatomical faulty conditions that cause and precede pathological processes observed in the digestive organs such as ulcers of the stomach and duodenum, carcinoma of the stomach, pancreatitis, duodenitis, cholecystitis and cholelithiasis, stenosis and obstruction of the intestine, acute and chronic appendicitis, and chronic constipation. It is my contention that microorganisms would not cause any lesion if the faulty anatomical conditions described did not exist.

In order to cure the pathological conditions mentioned the faulty anatomical structure must be corrected first.

By improving our methods we may succeed in diagnosing these conditions early in life and by a very simple and harmless operation prevent later serious develop-

ments such as ulcers of the stomach and duodenum, carcinoma of stomach and intestine, pancreatitis, cholecystitis, cholelithiasis, stenosis and obstruction of the intestine, acute and chronic appendicitis and chronic constipation.

The stage preceding the gross changes resulting in the formation of ulcers, carcinomas, calculi, perforation, stenosis, obstruction, etc., is not due primarily to the work of microorganisms. It is due to anatomical defects formed during intrauterine life, the fusion of portion of the transverse mesocolon with the lesser omentum being the most frequent and most important.

The great majority of patients who complain of the usual indefinite digestive disturbances, diagnosed as chronic appendicitis, cholecystitis, dyspepsia, chronic constipation, etc., actually suffer on account of the fusion of the mesocolon with the lesser omentum, as herein described. Their condition can be successfully diagnosed and relieved by safe and satisfactory operation. Complete cure is obtained in the great majority of cases, very marked improvement in the others. This assertion is based on over 50 cases I have observed and operated on in the last four years in my services at the Greenpoint and Flower Hospitals.

I wish to express my thanks for the assistance rendered by Dr. Nidish, pathologist of the Greenpoint Hospital, and to Dr. Ratner, intern, who sketched illustrations 1 to 4 during autopsies.



# ROENTGENOGRAPHY IN THE DIAGNOSIS OF GASTROINTESTINAL PERFORATION\*

M. H. TODD, M.D., F.A.C.S.

LYNCH, KY.

I WISH to call attention, in this brief report, to the importance of the routine use of the roentgen rays in the diagnosis of suspected perforation of the gastrointestinal tract.

Our attention was first called to the subject by the article of G. H. Copher<sup>1</sup> and later that of Vaughan and Brams<sup>2</sup> appearing in 1924. These writers state that the presence of air or gas in the peritoneal cavity can be demonstrated with great certainty by the use of the roentgen ray, and that the diagnosis of perforated duodenal ulcer is thereby made much more definite. A recent brief review of the literature shows that a number of other authors have also described spontaneous pneumoperitoneum and its detection by the roentgen ray, among them Lenk as early as 1916, Dandy in 1917, and more recently Guillemin, Kellogg, MacCharles and others.

In spite of this considerable literature, however, inquiry at several hospitals has disclosed the fact that the method is not in general use. We believe it of the utmost importance in this field, where accurate diagnosis is vital and often very difficult. I wish here to record our experience with it.

Since November, 1924, we have made it routine to take roentgenograms whenever perforation of any sort has been suspected, whether ulcerative or traumatic. All but one of our cases have been traumatic. We are very much impressed by the clearly defined results of the method, and are led

to consider that when a bubble of gas is detected in the peritoneal cavity in the roentgenogram, it constitutes the strongest evidence that can be obtained of the presence of perforation; and we believe that a consistently negative roentgen-ray finding speaks almost as strongly against its existence. There is an exception in the case of the appendix; perforations of this viscus are said to show no gas in the peritoneal cavity as the rule. It is also said that perforations of the stomach may not with certainty give rise to pneumoperitoneum, for this organ may occasionally contain no air, although it generally does. I have no evidence to bring forward on these points, for our cases have concerned the intestine itself.

We have had 10 cases, listed below, in which there was a well-defined possibility of perforation. In the first 4 of the list, perforation was present and found at operation; in the fifth, no autopsy was permitted, but the location of the wounds made perforation a certainty. In these 5 cases, the roentgen-ray findings were positive.

In the sixth case, the location of the wounds made it certain that some of the abdominal viscera had been damaged, and laparotomy was performed in spite of the negative roentgen-ray findings; the sign was thought to have failed. A ruptured spleen was the only lesion found, however, and prompt recovery followed its removal. In the 4 remaining cases, no perforation existed to our knowledge; they all recovered without operation. In these 5 cases, the roentgenograms gave negative findings.

In all of our small series, then, the procedure has given consistently accurate results whether negative or positive.

<sup>1</sup> Copher, G. H. Demonstration of spontaneous pneumoperitoneum by roentgen ray; an aid in diagnosis of acute perforating peptic ulcer. *J. Am. M. Ass.*, 1924, lxxxii, 781.

<sup>2</sup> Vaughan, R T., and Brams, W. A. Early recognition of acute perforation of gastric and duodenal ulcer by X-ray examination of spontaneous pneumoperitoneum. *Surg., Gynec. & Obst.*, 1924, xxxix, 610-617.

\* From the Lynch Hospital of the United States Coal & Coke Company, Inc.



The technique that we have used has been very simple: the patient has been made to sit up for a moment, when everything was in readiness, and a film was then placed anteriorly, so as to show the lower chest and upper abdomen. Double screens were used, and the exposure made was very brief, a second or less, the patient being instructed to hold his breath for a moment to fix the diaphragm.

The findings have been perfectly definite; the slightest quantity of gas appears on the film with beautiful distinctness as a narrow sickle-shaped dark zone, separating the liver from the diaphragm above it. It is most important to secure momentary immobility of the diaphragm, since any slight movement might obscure a very narrow zone of gas. In case of any doubt, the roentgenography should be repeated, the upper border of the liver being made to appear very sharp and clear cut on the film.

We have not depended upon simple fluoroscopy in our cases, because the eye, being much less delicate than the film, might fail to discern a very narrow zone of gas. In this respect our technique differs from that of Vaughan and Brams.

#### REPORT OF CASES

CASE 1. I. F., male, colored, admitted November 16, 1924, with multiple gunshot wounds, including one of the right chest.

The wound of entrance was two finger-breadths above the costal margin, in the right axilla, the ball lodging in the right lumbar region, somewhat lower down. Patient was seen by me nine hours after admission, and at that time a single small spot of abdominal tenderness was present, somewhat above and external to McBurney's point. White blood cell count 20,000. Pulse 100, excellent quality. Patient did not feel ill.

Five hours later, fourteen hours after admission, patient was examined again; he had felt worse during the preceding two hours, with more pain in the abdomen and with more rapid respiration; there was somewhat more tenderness in the small area noted above, still sharply localized.

Roentgenogram taken at this time revealed presence of bubble of gas above liver. Immedi-

ate operation showed beginning general peritonitis, not yet severe, with general injection of all the intestines. There was a small amount of free fluid near hepatic flexure of colon; and a single small perforation, the ball having just grazed the intestine in passing into the lumbar muscles.

Convalescence was uneventful; patient is now in perfectly good health.

Comment: the roentgen-ray examinations should have been made much earlier; we were then not familiar with the procedure, it being our first case.

CASE 11. N. P., male, white, admitted December 6, 1924.

The patient was sent in from another mine, the case being diagnosed as severe contusion of the abdomen. He had been injured an hour before admission by a fall of slate, a timber being driven violently against the abdomen. (Patient stated to a friend that his abdomen felt as if it started to swell at once, though this was not known to the writer until after operation.) There was considerable shock on admission, with severe pain in the chest and pelvic region. Roentgenograms showed the pelvis and chest negative to fracture. There was quite a little tenderness in the lower abdomen, right side, with definite protection. Morphine had been given at the mine. White blood cell count was 16,000. Patient was placed under observation, as in acute abdominal conditions. No more opiates were administered.

Two hours after admission, the white blood cell count had fallen to 6000, suggesting much lowered resistance. There was steadily more pain in the abdomen; patient felt very ill.

It was decided to operate at once. During preparation, a roentgenogram was taken, the patient sitting for a moment. A gas bubble was present between the liver and diaphragm. This roentgenogram was taken purely to corroborate the diagnosis of rupture of the intestine; operation would have been performed in any case.

Operation disclosed free bloody fluid in the peritoneal cavity, with corn and other fecal material floating about. Lateral aspect of cecum and ascending colon were torn widely open, mesocolon was also extensively torn.

Viability of gut seemed questionable at first; apparently better after repair of tears. Repair was rapidly effected with catgut, drainage placed in pelvis through stab wound, as well as

to the region of the cecum. Speedy closure with simple through-and-through sutures.

CASE III. J. O., male, white, admitted January 22, 1926.

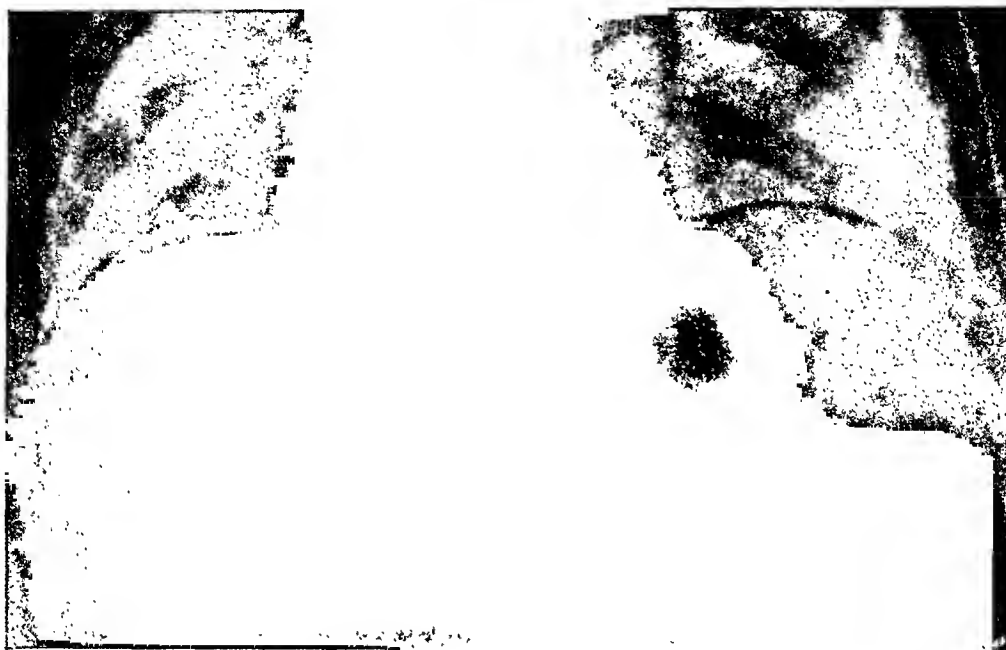


FIG. 1.



FIG. 2.

Profound shock occurred; intravenous saline was given on the table, with the other usual measures of stimulation. The patient died twelve hours after operation.

When admitted, patient was suffering acute pain in the right upper abdomen, radiating toward the left scapula, with intense vomiting, of several hours' duration. Some relief was

obtained by bending over a hot radiator. On admission, marked rigidity in right upper quadrant of abdomen, apparently involuntary, was noted.

There was a history of prolonged trouble in right upper abdomen, reasonably typical of gall-bladder disease. Had been treated for cholecystitis.

Roentgenogram was taken, the patient sitting up for a moment as usual, for the reason that there was marked rigidity, actually board-like, though when seen by me, three hours

Patient was injured three days before admission, receiving a gunshot wound in the right lumbar region, the ball ranging upward. He was retained in jail for two days before being brought to the hospital.

Examination showed a thin young colored man apparently not critically ill, with some pain in left lower abdomen, tenderness and some protection. Pulse, respiration and temperature were about normal. Roentgen-ray examination showed a bubble of gas above the liver.

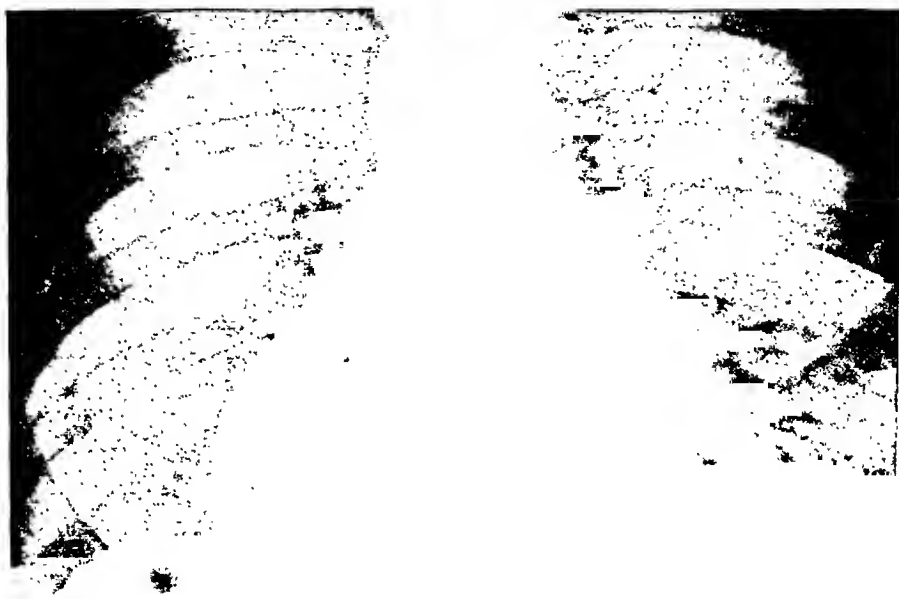


FIG. 3.

after admission, the pain was only intermittent. Gas bubble was found between liver and diaphragm. Immediate operation was insisted upon. Diagnosis was perforation of some viscus, probably duodenal ulcer.

Operation showed perforated duodenal ulcer near pylorus, gall bladder negative. Perforation was closed and posterior gastroenterostomy done.

Patient was seen two months after discharge from hospital; recovery was excellent, convalescence perfectly uneventful. Modified Sippy diet was continued. Patient now works regularly.

CASE IV. H. M., male, colored, admitted August 4, 1926.

Operation disclosed multiple perforations of the small bowel, in the upper portion; two or three of these were closed over by adherent loops of intestine, so that there was no leakage; there was open leakage from two. The perforations were sutured and the wound closed with drainage. There was only a mild peritonitis present.

Patient's general condition became very precarious forty-eight hours after operation; he made a good response to stimulation; a fecal fistula manifested itself after several days. August 18, 1926, general condition was quite satisfactory, though there had been a recent severe attack of abdominal pain, apparently

brought on by overeating. Patient was still in the hospital. The patient died ten days later, incomplete autopsy showing general peritonitis.

CASE V. R. P., male, colored, admitted February 8, 1925, with multiple gunshot wounds of trunk, abdomen and chest. Shock was not marked at first; pulse was 72. Preparation was made for emergency operation. In the interval, a roentgenogram was taken, the patient sitting for a moment. Gas bubble was found between liver and diaphragm.

Before anesthesia was begun, the patient

admission. There was a little shock, the patient feeling weak and sick. The location of the wound made it certain that some of the abdominal organs must have been injured. A little tenderness was present in the left upper quadrant.

Exploratory operation was planned to be done at once. (In the interval, amputation of an arm in another case was done, seemingly a greater emergency; this permitted primary shock in the gunshot case to subside, as well.)

Roentgenogram was taken with the patient



FIG. 4.

became much weaker, his general condition being so unfavorable as to prohibit any interference. Death occurred nine hours after admission.

The roentgenogram in this case was made within an hour after the injury occurred. The location of the wounds made it certain that intestinal perforation had occurred.

No autopsy was permitted.

CASE VI. J. K., male, colored, admitted January 23, 1926, with a self-inflicted wound of the left chest, a little below the heart, perforating anteroposteriorly, by a pistol ball.

The injury occurred a few minutes before

sitting, an hour after admission. It showed negative findings as to gas bubble and to fluid in the left chest.

Operation was performed, nevertheless, because of the location of the wounds. A severe laceration of the spleen was found, with some bleeding continuing. Careful inspection of the stomach and neighboring intestines showed no injury to them. Splenectomy was performed, closure made without drainage.

Recovery from the operation was excellent. Left hemothorax slowly developed, and was treated by aspiration. Recovery has been complete, patient now being apparently normal.

CASE VII. L. T., male, colored, admitted February 17, 1926, with a stab-wound in the left side of the abdomen, of questionable depth. Roentgenogram, made with the patient sitting, showed no gas bubble above the liver.

Treatment: Patient was placed under observation as in acute abdominal conditions; simple dressings were applied.

The wound healed without complication and without evidence of injury to the viscera. Convalescence was entirely uneventful.

the right costal margin, 2 inches from midline. Patient was somewhat intoxicated; bleeding was considerable, no actual shock. Abdomen was tender in right upper quadrant, with slight tenseness, apparently voluntary. There was no tenderness elsewhere.

Roentgenogram was negative as to pneumoperitoneum. Treatment was expectant, as in acute abdominal conditions; no opiates were given, sips of water only.

Roentgenography was repeated eight hours



FIG. 5.

CASE VIII. W. J., male, colored, admitted February 26, 1926, with gunshot wound in right flank, from below upward, the ball lodging near the angle of the right scapula. Injury to the abdominal viscera was possible from the location of the wound. Roentgenogram was taken in the usual way, and found negative as to gas bubble.

Treatment was expectant, as for acute abdominal conditions. (The patient also had a gunshot fracture of the humerus, which was treated as usual.)

Recovery was perfectly good; the patient left the hospital against our advice.

CASE IX. J. M., female, colored, admitted March 13, 1926, with stab wound just below

after admission, and still showed negative findings. Abdomen was slightly more tender after twelve hours and held a little stiffly; tenderness was present also a little to the left. Tenderness was nowhere acute, however, and there seemed to be no actual involuntary spasm. White blood cell count was 21,000.

Twenty hours after admission, there was still considerable bleeding; thromboplastin was given intravenously. White blood cell count was 13,000.

Twenty-four hours after admission, there was considerable improvement, with less tenderness and very little bleeding. Temperature was normal, pulse 100.

Convalescence from this point was unevent-

ful. Patient was discharged one week after admission.

Comment: This is the first case in which definite reliance was placed in the roentgenogram for signs of perforation; inasmuch as it was negative, exploration was not done; otherwise there was sufficient tenderness to make it perhaps wise.

CASE X. B. B., male, colored, admitted May 16, 1926.

This patient was treated during my absence. He was admitted with a gunshot wound of the right lower chest, perforating. Wound of entrance was two finger-breadths above the costal margin in the mammillary line; exit an inch lower in the posterior axillary line; length of bullet track about 6 inches. The liver was evidently perforated, possibly also the hepatic flexure of the colon. The man was drunk. There was free bleeding. The projectile was a .45 caliber pistol ball.

There were no abdominal symptoms. Treatment was expectant, as for acute abdominal conditions. After sixteen hours, abdominal tenderness developed, with some tenseness in the right upper quadrant. Temperature 102°F. Roentgenogram was taken with the patient sitting, with negative findings as to gas bubble above the liver. A small enema was given with caution, and gave relief.

Recovery was otherwise uneventful and complete. Patient was seen a month after injury, and was working daily.

#### CONCLUSIONS

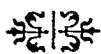
We have found very consistent confirmation of the fact, reported independently

by several writers, that gastrointestinal perforation may be diagnosed by noting the presence of a gas bubble above the liver in the roentgenogram. We believe it to be by far the most important single sign of the condition and it is easily demonstrated even where the perforation is minute. It appears to me that the use of the roentgen ray is here nearly as important as it is in the diagnosis of fractures, and that it should be employed in all cases where it is at all possible, or where any reasonable doubt exists as to the condition present.

A feature of extreme importance is the fact that perforation may thus be diagnosed very early, much before other signs may become definite, perhaps within an hour; far earlier, of course, than any tympanitic note could be detected on percussion. The attempt to demonstrate loss of liver flatness, for instance, in suspected typhoid perforation, would appear to be a much less delicate method of diagnosis.

The technique is very simple, though exact; momentary fixation of the diaphragm is essential; and the making of a film, not simply fluoroscopy, seems to us decidedly the method of choice.

A negative finding is apparently nearly as significant as a positive one; certainly it is of great value, though other signs, as in the case with ruptured spleen, may make exploration imperative even when the roentgen-ray findings are negative.



# LOOP OPERATION FOR PARALYSIS OF THE ADDUCTORS OF THE THUMB

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FOR the treatment of paralysis of the adductors of the thumb, two operations have been published, those of Ney<sup>1</sup> and Steindler.<sup>2</sup> In the Ney operation the extensor brevis pollicis is severed about  $\frac{1}{4}$  inches from its insertion, the distal free end is brought through a subcutaneous channel to the anterior aspect of the wrist and is there sutured to the palmaris longus. Though the operation improves the posi-

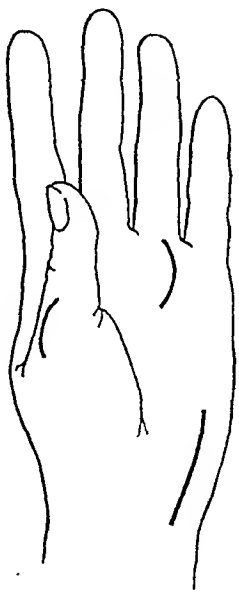


FIG. 1. The three skin incisions.

tion of the thumb it fails, so far as I have observed, to give the normal range of strength to the opposing action of the thumb. Steindler's operation consists in splitting the flexor longus pollicis tendon longitudinally from its insertion down to the metacarpophalangeal joint and suturing one half the tendon to the dorsum of the proximal phalanx in such a way as to rotate the thumb towards the palm. Steindler reports excellent results and the operation is unquestionably a simple and ingenious procedure.

A third method, that of Sterling Bunnell of San Francisco, not yet published, deserves to rank with the Steindler in the excellence of its results. From the standpoint of operative technique it is significant since it demonstrates a new use of free tendon grafts. It was first demonstrated to me on the cadaver by Dr. Bunnell in January, 1926. The method consists, briefly, in the utilization of a free tendon transplant to form a pulley on the ulnar side of the wrist through which one of the flexor tendons is brought and then transferred subcutaneously across the palm to the base of the proximal phalanx of the thumb. This operation seemed to me superior to Ney's because the line of traction of the substituting tendon was more nearly that of the paralyzed adductors and therefore more nearly imitated the normal opposing action of the thumb.

Since the time of Bunnell's demonstration I have had opportunity to perform this operation in 5 cases of infantile paralysis involving the adductor muscles of the thumb. In all cases there was complete inability to oppose the thumb to the fingers. The technique of the operation, differing somewhat from Dr. Bunnell's method, retains the essential feature of the pulley. The steps are:

1. A semicircular incision 1 inch long is made over the base of the proximal phalanx of the thumb, the convexity directed towards the dorsum (Fig. 1). The skin flap thus outlined should be so placed as to expose the dorsum and by gentle retraction also the palmar surface of the phalanx. Through the phalanx about  $\frac{1}{2}$  inch from the joint a small drill hole is made, passing from the dorsal to the palmar surface.

2. A second incision is made along



the ulnar aspect of the wrist extending from a point corresponding to the level of the pisiform downward in a straight line for a distance of about 2 inches. The ulnar nerve is first exposed and carefully drawn aside, then the sheath of the flexor tendons (Figs. 2 and 3) is opened and the tendons inspected to determine which are suitable for transplantation purposes. As a rule, I have selected the flexor sublimis tendon of the third finger for the free graft to construct the pulley

ulnar side of the midline of the finger but not so far over as to injure the digital nerve. The sublimis tendon is identified, is cut transversely and is then freed from the peritenon as far upward as possible. The corresponding tendon is then located in the carpal sheath and by a quick snapping motion with any blunt instrument the tendon is snapped out of the palm. If care has been taken to divide the peritenon as far upward as possible this procedure is accomplished quite easily.

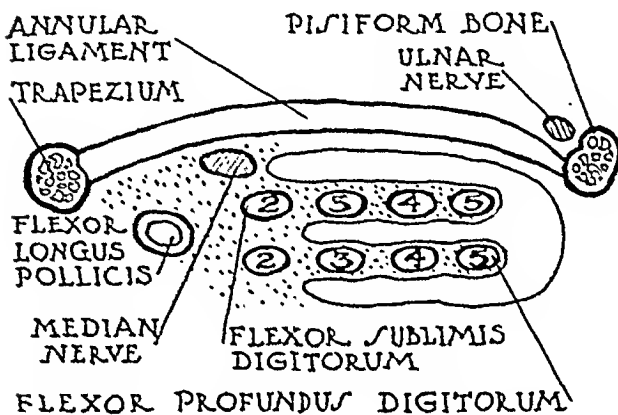


FIG. 2. Diagrammatic cross section through the anterior portion of the left wrist showing the relationship of the chief tendons and nerves. Exact knowledge of the anatomical arrangement is essential to proper execution of the operation.

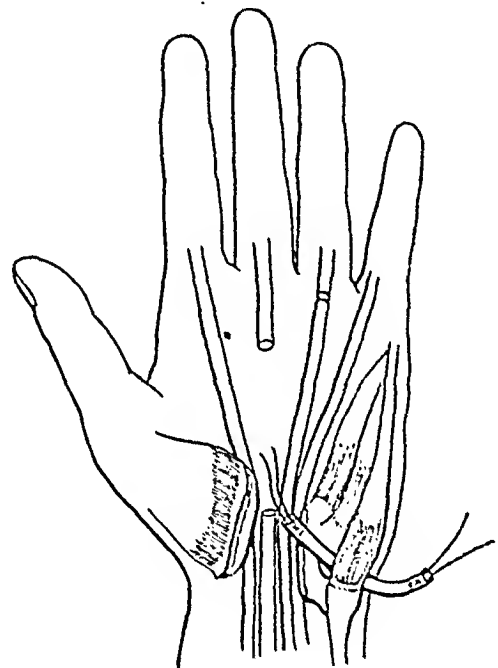


FIG. 3. A section of the sublimis tendon of the middle finger has been removed, threaded with a silk stitch at each end and brought through a musculo-fascial tunnel just distal to the unciform bone. The sublimis tendon of the fourth finger has been divided at the base of the fourth finger preparatory to its transplantation.

and the flexor sublimis tendon of the fourth finger for the transplant to the thumb. The tendon loop must be strong enough to withstand the lateral pressure that is going to be brought against it by the transplanted tendon. The free tendon graft must be about  $1\frac{1}{2}$  inches long. It is threaded at each end with a braided silk stitch and this is then brought through a small tunnel in the muscles and fascia just distal to the unciform bone (Fig. 3). The two ends of the tendon are not united yet but are left open so as to make the transplantation of the tendon to the thumb somewhat simpler.

3. The third incision is made at the base of either the fourth or the third finger, depending upon which of the sublimis tendons has been selected as a substitute for the thumb tendon. The incision is about 1 inch long and is placed somewhat to the

4. The free ends of the tendon graft that are to form the loop are now brought around the substituting tendon of the sublimis. They are united to one another and then the tendon loop is rotated a little so as to bring the suture inside of the muscle tunnel. The free end of the sublimis tendon is brought through a subcutaneous channel running transversely across the palm over to the base of the proximal phalanx of the thumb (Fig. 4).

5. The end of the sublimis tendon is now threaded with No. 2 braided silk and this

silk strand is passed through the drill hole in the proximal phalanx of the thumb. Care should be taken that the direction of the tendon should be from the dorsal surface of the thumb towards the palmar. This will insure a much stronger opposing action than if the reverse direction is followed. The tendon should be long enough so that it will pass completely through the bony canal and can be sutured to itself. All the wounds are closed by means of fine

reproduces the effect of the paralyzed adductor muscles. It has the disadvantage of being a somewhat complicated procedure necessitating more extensive incision and dissection. The practical results are unusually gratifying. In all 5 cases operated on by me there has been excellent opposing action of the thumb and the usefulness of the hand has been much improved. It has been of particular interest to note the free gliding of the transplanted flexor tendon

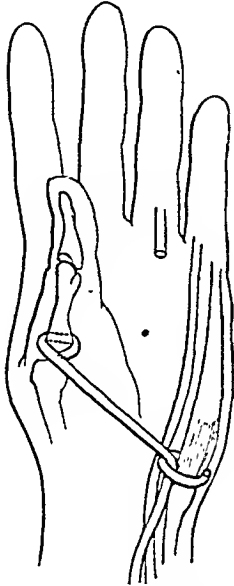


FIG. 4. The sublimis tendon of the ring finger has been passed through the loop formed by uniting the two ends of the free transplant of the sublimis tendon of the middle finger. The free end of the ring finger tendon has been brought diagonally across the palm and drawn through a drill hole in the base of the proximal phalanx of the thumb. The drawing illustrates the line of traction exerted by the transplanted tendon.

fascial stitches and continuous sutures for the skin. As a rule oo plain catgut is used for the skin sutures. The thumb is fixed in a position of opposition by means of adhesive plaster strips. It is kept immobilized for a period of fourteen days and then gentle active exercises are begun. These must be kept up for a period of at least six weeks to secure the maximum effect of the transplanted tendon.

Comparing this operation with Steindler's it has the advantage that it fully



FIG. 5. Photograph illustrating the opposing action of the thumb after the operation. The tendon can be seen in its course across the palm.

and the action of the tendon loop. A genuine pulley seemed to have been constructed closely resembling that of the omohyoid muscle. These results would seem to be another proof that with adequate care, free tendon grafts can be utilized without destroying the gliding function of the superficial tendon cells.

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# PHYSICAL THERAPY

## AN AID TO MORE PERFECT SURGICAL END-RESULTS

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KERRVILLE-ON-THE-GUADALUPE, TEXAS

**S**URGICAL technique is today very largely standardized. An appendix is removed in much the same manner in New York City as in San Francisco. A hysterectomy is about the same procedure in Hong Kong as in Vienna. The surgeons of Texas in dealing with the thyroid use a very similar technique to that employed in Illinois and Minnesota.

It is not, then, so much to improvements in surgical technique that we must now look for the production of more perfect end-results as to a more detailed pre-operative study of our cases and a more intelligent and painstaking after-treatment.

A high percentage of the patients consulting a surgeon have been sick a long time. Many of them have tried various physicians and sundry cults before the surgeon is appealed to, for all too often even today he is regarded as the court of last resort.

These patients are sick in mind as well as body; they have sick habits; they think sick thoughts. Simply to perform a hysterectomy, a cholecystectomy or any other operation on patients of this class and turn them loose will produce perfect end-results in very few cases indeed.

If these same patients were to consult a Christian Scientist, a chiropractor or any one of a dozen pseudoscientific cults, the chances are ten to one that for a while they would apparently be benefited, long enough for the cultist to make good advertising of it at least.

The cultists get their results almost entirely through psychology. They change the patient's thoughts, breaking up wrong thought habits; they impress the mind weakened by disease and implant suggestions there that produce what to the uninformed seem almost miraculous results.

Of course these seemingly wonderful cures of the cultist are only very transient and temporary in the cases where true organic disease is present and a wrong diagnosis or too vivid imagination will explain the others. In any case, however, the surgeon who studies and uses psychology can bring his patient to the operating table in better condition for the operative ordeal and can surely secure far more perfect end-results in the chronic cases.

It is natural for sick persons to want something done for them; they like personal contact, the touch of a hand, the use of heat, light, electricity, etc., anything that gives the suggestion of action, that the physician is really doing something.

I have often thought that if the various modalities employed in physical therapy, and now rapidly being placed on a scientific basis, had no intrinsic value but depended entirely for their benefit upon the psychic effect produced, they would still be a tremendous force in the armamentarium of every thinking surgeon. Anything that will intensify the effect of therapeutic suggestions will aid in securing better end-results in chronic cases.

The very reason, however, why physical therapy is not more generally employed by leading surgeons, the reason why, until lately, only a few hospitals had installed adequate equipment, is that the great majority of physicians and surgeons have taken it for granted that psychic effect is the alpha and omega of physio-therapeutic efficiency.

In the winter of 1906 and for a number of years thereafter I gave a course of lectures to students and physicians in one of our largest medical centers on physical therapy as an adjunct to modern medical and surgical practice.

The majority of my colleagues seemed to think that I was wasting my time. In 1915 I read a paper before a large county medical society in which physical therapy was recommended as an aid to more perfect postoperative results. After the meeting a leading surgeon of the city expressed himself on physical therapy in general and my paper in particular as "a lot of bunk."

This surgeon went to France as a major; in 1920 he was again well established in new city offices with a suite of treatment rooms adjacent and a physical therapist in charge. The World War spoiled some good surgeons, but it let a little education into others of the ultraconservative type.

The fad and fanatic stage of physical therapy is now rapidly passing; modalities of proven merit that can be placed on a scientific basis will be continued and elaborated while a number of measures of doubtful efficacy will be dropped.

Twenty years ago Mumford of Harvard taught: "I have employed massage for years in fracture cases that have come under my care, and am constantly impressed with its advantages—in the hastening of repair, in the early restoration of function, perhaps, best of all, in the sense of well-being given at the time, and in the feeling of security and confidence as soon as the patient reaches the stage at which active movements begin to succeed these passive ones. Under the old-fashioned treatment the arm was like a prisoner confined for weeks in a dark, narrow cell, to emerge at the last, pale, timid, spiritless, broken down—who must wait weeks yet before his proper vigor returns to him. With massage you let in air and light upon your captive; his windows are thrown open daily, and he is taken out for a brisk walk, as it were, about the prison yard. At the end of his confinement he returns to the former life with his force but little abated and his zest sharpened for the work of the world."

"There are numerous other conditions in which massage is of the greatest value, especially in contractures and deformities left by old injuries or inflammatory pro-

cesses which have subsided. In those cases patience and faith are often required for a long time, but the final results usually justify the treatment. As to the use of general massage after major operations and prostrating surgical affections, let me say that I have employed it commonly in such conditions, and with the most gratifying results, for the secretions are thereby increased, the circulation improved, the appetite, sleep, and mental state stimulated, and the convalescence, after the patient's getting out of bed, materially and happily abridged." Today surgeons everywhere are beginning to see the truth in this.

I well remember how enthusiastic Ochsner of Chicago became over the improvement in wound healing under the simple incandescence light. Today actinotherapy, electrotherapy, hydrotherapy, massage and other physiotherapeutic measures are being placed on a solid footing and it is possible for graduate nurses to specialize in this field and make themselves indispensable to the wide-awake surgeon.

The time was when surgeons counted success by the number of patients that left the operating table still alive. Then it stretched to getting out of the hospital alive, then to how many years the patient lived after the operation. What surgeon today would be satisfied with mortality rate as the criterion of his success? Some are, but when you or I are operated upon we will prefer the surgeon who prides himself on end-results, small percentage of disability, the surgeon who attempts to restore his patients to a useful, helpful place in society.

When we find a surgeon of this type we will find a man who does not lose interest in his patient as soon as the last suture is placed; he will not turn the postoperative treatment over to interns and nurses. The patient is an individual to him whom he follows weeks, months and years postoperatively. It is only thus that perfect end-results can be made the rule.

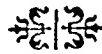
As an aid in securing a smooth postopera-

tive convalescence and more perfect end-results in our clean cases, physical therapy will be found of the very greatest value. In relieving deep soreness, preventing vicious adhesions, restoring function of muscles and tendons, stimulating the general metabolism and to assist in driving home the proper therapeutic suggestion to correct unhealthful thought habits, the various modalities at our disposal will each show real worth. But it is in our pus cases, indolent ulcers, extensive sloughing wounds, bone infections and delayed restoration and repair of all sorts that we get our most spectacular results from a proper

use of physiotherapeutic procedures as an adjunct to medication and surgical dressing.

If physical therapy will restore a producer to his place in society in a shorter space of time and with a smaller percentage of disability, no surgeon should be satisfied until he has at his disposal an efficient modern equipment.

The size of a city or the size of a hospital has nothing to do with the perfection of end-results; it is the size of the surgeon that counts most, and all the really big men will welcome any agency that will aid in improving our surgical end-results.



# SPONTANEOUS RUPTURE OF THE DEEP EPIGASTRIC ARTERY:

## A REPORT OF TWO CASES

HARRY B. EPSTEIN, M.D.

NEWARK, N. J.

**N**OTHING stimulates the interest of the surgeon so much as the unusual. The occurrence of so rare a lesion as spontaneous rupture of the deep epigastric artery twice within five months in the practice of one surgeon has in it almost an element of the bizarre.

**CASE I.** On March 17, 1926, a florid-faced, heavy-set man, aged forty-four years, weighing about 220 lbs., while at his usual occupation as a laborer, was suddenly stricken with agonizing pain in the right side of his abdomen, about 2 inches above the umbilicus. A swelling presented itself, rapidly growing larger, and Dr. William Rado was summoned. He found: Temperature, normal; pulse, 114 and regular; blood-pressure, 138/84; chest, negative; abdomen, tender; a swelling along the right upper and middle quadrant of the abdomen, 8 in. long and 3 in. wide, and projecting 1 in. from the abdominal wall. The patient was given morphine and taken to the hospital where I was asked to see him in consultation.

I found that the heart, lungs, and other organs were negative. There was a tumor on the abdomen, shaped like a parallelogram and of the dimensions mentioned above, with a bluish discoloration. It felt doughy, but did not fluctuate; there was no impulse upon coughing or straining; and it was irreducible. A preoperative diagnosis of probable rupture of the deep epigastric artery was made.

Operation was performed at 11 A.M., two hours after the seizure. An incision was made over the middle of the growth and a large amount of clotted blood was turned out. The tumor extended to the median line and laterally to the outer edge of the rectus muscle. After the blood was evacuated, there was bleeding from the deep epigastric artery and vein, which were torn. The ends of both vessels

were tied with chromicized catgut, and the wound was closed without drainage. The subsequent course was uneventful and the patient left the hospital about one week after operation. He has been in perfect health since.

**CASE II.** On July 22, 1926, Mrs. R. D. was brought to the hospital, also by Dr. William Rado, with a diagnosis of spontaneous rupture of the deep epigastric artery, which I recognized on account of a similarity in the history with that of the previous case.

This patient, who had been treated by Dr. Rado for mitral endocarditis, was seized with a sharp pain in her right abdomen while sewing. The same type of tumor was found, but more extensive and spherical in outline, and deeper blue in color.

She was sent to the Newark Private Hospital and operated upon immediately under ether. An incision over the long dimension of the tumor was made; a large hematoma was turned out; the bleeding points of the ruptured deep epigastric artery and vein were tied; and the wound was closed without drainage. The patient remained in the hospital for four weeks. Digitalis was administered for her cardiac condition. She made a complete recovery.

In differential diagnosis we must consider the possibility of a hernia which, however, can be ruled out by absence of impulse on coughing and straining. The doughy "feel" is also encountered with an epiplocele.

We are obliged to speculate as to the cause of the vessel rupture. It would seem that it might be due to a localized arteritis or periarteritis, arteriosclerosis, or hypoplasia of the vessels, of which perhaps an infectious disease was the cause; or that a direct trauma may have damaged the

vessels making a later rupture possible. Very few cases have been recorded. Reporting one, Carey Culbertson<sup>1</sup> of Chicago cites the references to other instances of rupture of the deep epigastric artery and of the rectus abdominis muscle. In all these cases there seems to have been a

previous history of trauma, operation or pregnancy. The 2 cases I have here reported are instances of true spontaneous rupture of the vessel.

<sup>1</sup> Culbertson, C. Hematoma occurring spontaneously in sheath of rectus abdominis muscle; etc. *J. Am. M. Ass.*, 1925, lxxxv, 1955-1958.



#### [SURGICAL SUGGESTIONS]

THE inguinal glands are never involved with testicular tumors unless the scrotal tissues are invaded or unless, rarely, the deposits in the abdominal glands have caused a backward growth through the iliac nodes.

HYDROCELE may be due to a testicular growth.

A PARAMEDIAN fixed tumor in the upper zone of the abdomen associated with a scrotal hydrocele would suggest that the latter conceals a malignant tumor of the testicle.



# TRANSACTIONS OF THE SECTION OF SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of February 4, 1927*

THE CHAIRMAN, DR. EPIDURIO W. RANSFORD, PRESIDING

## THE TREATMENT OF ACUTE SUPPURATIVE PLEURISY IN CHILDREN

JOHN V. BOHRER, M.D.

*(Abstract)\**

**S**UPPURATIVE pleurisy in children presents a difficult problem. It is essentially a secondary disease, the child's vitality having already been depleted by primary pneumonia. Complications, such as acute otitis media or recurrence of pneumonia, especially in cold, windy months, are very common and these markedly increase the severity of the disease which in those under two years of age is in itself severe. The older textbooks of pediatrics state that the mortality in suppurative pleurisy in infants under one year of age is 100 per cent. Fortunately, this is not the case at present. In our series, the youngest patient operated on for empyema thoracis was three weeks old. This patient recovered as did many others in the infant group.

The plan of treatment should fulfill the following requirements:

1. Proper treatment of the primary disease with early recognition of the suppurative pleurisy.
2. Low mortality.
3. Minimum anatomical and physiological deformity.
4. Prevention of complications.
5. Early restoration to health.

Our general plan of treatment follows:

In the formative stage, if there is distress, aspiration is repeated as often as necessary. In a few instances, in strepto-

coccus cases, where the reaccumulation of pus is very rapid, the air-tight syphon drainage or suction method is used. However, this is not entirely satisfactory; repeated aspiration is the better plan.

When the fluid is frank pus and, as is often the case, the fever from the pneumonia has abated, open drainage is instituted.

Intercostal drainage with the so-called "flapper tube" is the method used. A flapper tube is made by fitting a glove finger (one that has been softened by repeated sterilization) on the distal end of a fenestrated rubber tube as a projection, the tube having been cut with a 60 degree bevel, forming a valve that readily allows fluid and air to escape with expiration, but closes with inspiration. This is an aid in lung expansion, as it tends to restore the negative intrapleural pressure, and is of use in irrigating at the time of dressing, as it forms a funnel through which irrigating fluid is passed into the chest cavity.

The operation is always done with local anesthesia. The patient, if not too sick, is allowed to sit up; cooperation is more likely to be had in this position. A small incision is made in the seventh intercostal space near the midaxillary line. Naturally the site of the incision varies with the location of the pus. A flapper tube is introduced and the pus is allowed to run out. The tube is held in place by one silkworm-gut stitch. At no time have there been any disturbing symptoms caused by completely evacuating the cavity at operation. Irrigation is started in the next few days, the exact time depending on the condition of the patient and the amount and character of

\* This paper was read only in part at the meeting. It will appear in full in a later issue of the JOURNAL.

the drainage. Usually on the fourth day the cavity is irrigated, the patient reclining with wound uppermost. Saline solution is introduced through the flapper tube, the measured amount determining the size of the cavity. If no coughing is produced, Dakin's solution is then used cautiously. If there is no "gassing" the cavity is then daily cleansed by thorough irrigation with Dakin's solution. This daily irrigation is not an attempt to sterilize the cavity, but is sufficient to keep thin and deodorize the discharge.

If, judged by temperature, appetite, type of discharge and general condition, it is found that the patient has not materially improved at the end of eight or ten days, and there is no acute otitis media or recurrence of pneumonic process, we conclude that we are dealing with a complicated form of suppurative pleurisy, such as multiple loculi or a markedly thickened pleura preventing complete drainage, and an exploratory thoracotomy is performed.

Under light ether or gas anesthesia, an intercostal incision is made, long enough to give proper exposure, and a rib spreader is introduced. If more exposure is required, a rib may be cut at one or both ends and telescoped. Under visual guidance, division of vicious adhesions, a partial decortication or any other procedure necessary is done, thus converting multiple loculi into a single cavity, or placing drainage where it is needed. This may appear radical surgery, but properly done it produces little shock and reduces mortality, shortens convalescence and cause no deformity.

The order of treatment in suppurative pleurisy is: first, adequate drainage; second, skilful nursing and high caloric diet; third, blood transfusion.

Only whole blood, by the Lindemann method, is given. With whole blood, accurately matched and given in proper amounts, reactions are seldom seen.

It is very difficult to make a classification of suppurative pleurisy cases, but for clinical purposes they may be divided into three groups:

1. Cases having good prognosis.
2. Cases having poor prognosis.
3. A middle group in which the prognosis is largely dependent on the kind of treatment received.

1. *Good Prognosis.* In this clinical grouping about 40 per cent of the patients come under the heading of good prognosis. The patient has inherited a healthy constitution and has been surrounded by fair conditions during health, the primary disease was promptly diagnosed and treated, the complicating suppurative pleurisy was encapsulated and, in turn, was promptly diagnosed and received proper care during its formative period. Such patients will recover if they are given adequate drainage by any of the methods advocated. The period of invalidism will be minimal. The type of organism is a minor matter. Recovery statistics in this group are very gratifying.

2. *Poor Prognosis.* Our series at Bellevue Hospital shows about 25 per cent in this group. Through the Social Service Department we have found living conditions bad, unhealthy parents, dirty unsanitary homes, underfeeding and exposure. Rickets is almost universal. Add to this background a virulent infection, the primary disease improperly diagnosed, a starvation diet, and the child sent to the hospital only when in extreme condition. Such cases, with an encapsulated suppurative pleurisy, will often do surprisingly well if given adequate drainage and plenty of food. But in a patient with a virulent infection with complicated pleural involvement, or one who has already developed complications such as acute otitis media, or pneumonia of the opposite lung, the prognosis is universally bad regardless of the type of operative procedure.

3. *Middle group* (prognosis much dependent upon surgical procedure). The remaining 35 per cent fall in this group. In this class, where the background has been only fair, the treatment of the primary disease good, but the infection virulent, the surgical treatment largely determines the ultimate outcome.

One hundred and fifty-four children's cases are here reported covering a five-year period from 1919 to 1924 inclusive. These children, ranging from infancy to twelve years of age, were admitted to Bellevue Hospital on the Children's Surgical Service. The cases were divided into age groups for a statistical study. The first or infant group includes all children under two years of age; the second from two to six years; and the third from six to twelve years. The mortality of the first or infant group, 48 cases, is 35.4 per cent; of the second group, 73 cases, is 10.9 per cent; of the third group, 33 cases, is 3.3 per cent. The mortality for the entire series of 154 cases is 16.8 per cent.

### Discussion

DR. HOWARD LILIENTHAL: It has been a great pleasure to me to hear what Dr. Bohrer had to present, inasmuch as he states that he follows the principles I have tried to teach. It has been most gratifying to see the work he has done, and particularly to note the results in a class of cases as difficult as anyone is likely to encounter, those of the children in the service at Bellevue Hospital.

I would like to point out one or two things of interest in connection with this subject. In the first place, I am delighted to see that Dr. Bohrer is making use of free thoracic exploration and that he has had such good results with it. Most surgeons are afraid of it. But if they have an ocular demonstration of the procedure and come to see the patient next day they will learn that it is not as shocking as it seems. Dr. Bohrer has wisely used transfusion in many of these children and that is also a very good procedure. This "dangerous operation" shows only a mortality of 4 per cent. The combined operations show 16.8 per cent. People do not ordinarily realize, until they have done surgery for a long time, that empyema in a child is a very dangerous disease and that in those that apparently get well a secondary operation often has to be performed, with a very considerable late death rate.

Another point in addition to those mentioned by Dr. Bohrer is that in children it is easier to reach all parts of the chest with a comparatively small opening than it is in adults. In addition to the high caloric diet, I believe in

"anti-prohibition" in the treatment of these cases. I consider the use of alcohol to be of the greatest importance, in fact sometimes a necessity. These children are losing albuminous material in large quantities and we must replace it with food. They are also wasting and by administering alcohol we produce the necessary heat. It is a valuable adjunct to the feeding. As to exposure of the child to cold, we must remember the proportion of the body surface to the entire bulk of the individual. An elephant has far less surface exposure to air relatively to bulk and weight, than a mouse. Children suffer more from exposure because of this ratio.

Dr. Bohrer has, avoided the rule of thumb method in treating his patients. Empyema is a disease which has to do not only with the presence of pus but with a protean, gross pathological anatomy and we have to know the case we are working with and handle it individually.

As to the flapper tube, I think I can make a good suggestion. Instead of using a glove finger, use the rolled up finger cot. This is very thin and will act much better as a valve, especially in a child. I tie it to the end of the tube and slit the closed end with scissors. With every expiration and cough air is forced out from the chest and we have gained in expansion of the lung. I do not wash out the chest with Dakin's fluid unless the case requires further operation with a fairly large thoracotomy. With the use of the flapper tube, no matter how thick and foul the pus, provided there is no hole in the lung, it will become thinner and serous and the lung will expand to the chest wall, when the tube may be removed.

There is one point where I think I shall have to differ with Dr. Bohrer and that is in the explanation of lung motion. On inspiration with the chest open the lung contracts and on expiration it expands. This is proved when the patient coughs; then the lung bulges and pus is forced out of the thoracotomy wound.

DR. R. E. STETSON: I think Dr. Bohrer has been most fair in giving credit to the transfusions that were done in these cases. It is hardly possible, without seeing them, to appreciate the condition of some of these children when they are brought in to the hospital. It was quite evident to all of us that certain patients would have died had it not been for transfusion. I agree with Dr. Bohrer's statements of the importance, not only of the technique but also of the study of the amounts of and intervals between transfusions. Anything that interferes

with the pulmonary circulation offers an obstacle to the success of the transfusions. It is only through experience that one can learn the dosage best for the particular case. We consider transfusion almost a routine. It has been most gratifying to feel we have played some part in keeping down the mortality statistics.

DR. ALFRED S. TAYLOR: I should like to express my gratification at this presentation. There are certain features that make their special appeal to me. In the treatment of these cases brains were applied to the problems presented by each individual child and the fact was not lost sight of that each case presented a physiological entity in the course of a serious disease, and attention was not focussed merely on the surgical lesion.

It is refreshing to listen to a paper, the conclusions of which are based upon the thoughtful consideration of a large group of personal cases, instead of rambling through the literature of the past century, in the modern style. With Dr. Bohrer's conclusions there can be no disagreement in essentials.

DR. THOMAS H. RUSSELL: I have had a number of these cases at Gouverneur Hospital during the past five years and have found that they have done very much better without irrigation of any kind than with it. I have attributed the success that I have had in empyema cases to the fact that I have been making much lower drainage, in the dependent part of the chest, after removing a piece of the ninth rib in the posterior axillary line. Since I have been using this method of drainage I have not had to reoperate a single case.

DR. LOUIS SACHS: I would like to ask Dr. Bohrer whether he has had any experience with closed drainage. I tried this on a case too sick for operation and the child got well.

DR. EDWIN G. RAMSDALL: I would ask Dr. Bohrer the age of the youngest child in his series. I do so because of a case seen recently at the Fifth Avenue Hospital. A baby three weeks old began with symptoms of toxemia and high fever, dating almost from birth. A diagnosis of empyema was made after a roentgen-ray examination, which revealed a massive collection of fluid in the left chest. In spite of a simple thoracotomy, this infant died in a few days of progressive toxemia and prostration.

In regard to the "flapper" drainage tube, I would like to ask Dr. Bohrer or Dr. Lilienthal if they happen to know where this idea originated. I first saw it used in 1919 in France by

Dr. Delagenière at LeMans. He told me he had been using this type of drainage, which he called "drainage Soupape" for several years before the War. I judged from his remarks that it was original with him. He ties a finger cot over the end of a plain rubber tube, which is inserted through a small wound in the chest wall. The skin is sutured about the top with one silkworm-gut suture. In this way no air can enter the chest. With every expiration, the pus spurts through the end of the tube and with inspiration, the little finger cot collapses over the end of the tube preventing the sucking-in of air. As the fluid level is reduced, the lung is bound to expand and collapse of the lung is in this way prevented.

I have used this method with a great deal of satisfaction since 1919 and am interested to find that Dr. Bohrer indorses it after so extensive an experience.

DR. HOWARD LILIENTHAL: The principle is an ancient one. I do not claim originality except in the use of the very thin finger cot instead of the rubber glove. As a matter of fact, the tube can remain in place for a long time if put in with a cannula. If there is leakage I put in a stitch to hold it. I did not wish to be understood as saying I never used irrigation; I always do so in open cases, but never in closed ones.

DR. FREDERIC W. BANCROFT: Has Dr. Bohrer noticed any poor results from long waiting in post-pneumonic empyema cases? During the War the treatment was evolved of waiting in streptococcus cases until the mediastinum was stabilized and frank pus was aspirated. This undoubtedly was a marked advance in our treatment of empyema. At the present time, however, I feel that perhaps the pendulum has swung too far and operation is often delayed until great thickening of the pleura has resulted. When the pleura has become too thick and rigid, obliteration of the cavity by expansion of the lungs becomes much more difficult.

DR. BOHRER (closing): Dr. Lilienthal brought out a very interesting point regarding the feeding of suppurative pleurisy cases. In dealing with children I had not thought of using alcohol, but I believe it would be useful and at times very valuable. The feeding problem has been the hardest one to solve. At the present time we have in the wards a fifteen-months-old baby who refused to take food and the only way to keep him alive was to provide a

special nurse who fed him small quantities every fifteen minutes. We tried gavaging this patient but he regurgitated even when given as small an amount as an ounce at a time. This was due to his stomach having contracted earlier in his illness. He is making a good recovery.

The suggestion of the finger cot on the flapper tube interested me. I tried various rubber flappers, such as a roll of rubber dam, a condom, and finger cot, but the one that proved most usable was a glove finger that has been sterilized and used many times. It is soft and supple and not friable.

When I first used a flapper tube I thought it was original. But I soon learned that others were using a similar device. It reminds me of a speech made by Dr. Joseph Bryant on the subject of "The Old and The New" in which he showed that many "original" present-day devices had been used years ago and forgotten.

As regards irrigation, that is a matter to be decided in individual cases. One must use judgment in irrigating. The decision depends on the type of discharge. The tendency is to watch the case and avoid putting anything in the chest, unless absolutely necessary.

The objection to using the ninth space is that the diaphragm becomes elevated as the chest condition improves and tends to block the opening. I use the seventh space in order to insure free drainage of this portion of the pleural cavity, as there is less expansion of the lung at this point.

As to closed drainage, I did some work with this in 1920 and was disappointed in the results. We had many empyema cases that year and I divided them into two groups, the open method and the closed method; I found the mortality in the closed method group was higher. It has therefore not appeared to me to be a satisfactory way of draining.

As regards age, the youngest child in this series was just about two weeks old on admission. How it could develop pneumonia and empyema at that time of life I do not know, but it did. I operated when it was three weeks old and found a small encysted cavity; the patient recovered.

I cannot answer Dr. Baneroff's question regarding the thickening of the pleura. The exact time to operate, so as not to prolong the period of waiting too much, has been a great question with me also. This is exceedingly important, as the thickness of the pleura is

increased if the time before operating is too prolonged. Judgment is necessary to determine that point.

## THE CONTROL OF HEMORRHAGE FOLLOWING NEPHROTOMY FOR THE REMOVAL OF CALCULI

DOUGAL BISSELL, M.D.

(Abstract)

Ureterotomy for the removal of renal calculi has certain advantages, but should the ureteral incision fail to heal, one is driven to the necessity of removing the kidney.

In cases of renal calculi ureteropyelolithotomy has been resorted to by me from 1901 to 1916. In the latter year there came under my care a patient with stone of considerable size in the renal pelvis. This was removed through an opening made in the upper ureter, but the delivery of the stone caused an irregular extension of the incision, difficult to repair, which became infected, with resultant persistent fistula. Nephrectomy was finally necessary. This unfortunate outcome directed my attention to the development of a nephrotomy technique for the removal of renal calculi with less liability to urinary fistula, and provision for the control of renal hemorrhage. The feature of the technique pertained chiefly to the closure of the renal incision and the removable sutures encircling the kidney, which are utilized, should necessity demand it, to stop postoperative hemorrhage.

When the kidney is delivered and freed from its cellular tissue, the renal vessels are isolated and are compressed directly by a ring forceps covered with rubber. A median longitudinal incision is now made through the kidney and the calculi are removed. The kidney incision is closed by passing a cambric needle large enough to accommodate No. 0 chromicized catgut. The suture is doubled, but its free ends are not tied. The small canal made by the needle is completely filled by the double suture. The needle is passed through the kidney

substance on a plane with the cut edges of the pelvic incision and repassed on the same plane in the opposite direction so as to form a loop. The securing of this suture may be made in one or both of the following ways: (1) the needle end of the double suture, after its final emergence, is passed through the double loop on the opposite surface and tied over the convex border to the free ends; (2) the double suture is severed from the needle and one of the severed sutures is tied as a mattress suture while its companion single suture is dealt with in a similar manner, as are the double sutures in the first method. Two B. and B. tension sutures are now passed completely around the kidney, one just above the upper and the other just below the lower limits of the hilum. To prevent these sutures from losing their positions they are made to penetrate superficially the anterior and posterior surfaces of the kidney, deep enough only to secure an anchorage in the fibrous capsule. After releasing the hemostatic clamp and returning the kidney to its bed, the free ends of the silk sutures are passed through all of the tissues on one side and the other of the lumbar incision and tied in a bow-knot over a bolster of iodoformized gauze. These sutures, when tightened as necessity indicates, will insure hemostasis and anchorage of the kidney to the abdominal wall.

A case had been operated on by another surgeon in 1913 to remove three calculi from the left kidney. Part of the technique then used was the passing of a rubber drainage tube through the kidney wound into the renal pelvis for direct drainage.

*Operation:* A left lumbar incision was made. Great difficulty was encountered in freeing the kidney from the abdominal wall, and an extensive area of kidney surface was severely traumatized. After freeing the ureter and renal vessels from each other and their encircling cellular structure, the vessels were grasped by a rubber-covered ring forceps and the kidney was incised longitudinally. The stone was then extracted from the pelvis. A cambric needle large enough to accommodate No. 0 plain catgut and threaded with this as a double suture, ends

not tied, was made to penetrate the kidney substance on a plane parallel with the cut edges of the kidney pelvis. The needle was then re-entered at a point less than 0.5 cm. from its exit and made to penetrate the kidney again on the same plane and emerge at a point 1 cm. from its original entrance. Four of these sutures were passed about 1 cm. apart. The needle end of each individual set of sutures was passed through the double loops on the opposite surface and tied to the free ends over the convex border. Two removable encircling sutures of silk were passed about the kidney, one above and one below the limits of the hilum, as described.

*Postoperative History:* During the first twenty-four hours a small amount of blood was found in the urine. No recurrence of bleeding was noted until the fifth day, when bleeding continued four days. The lumbar wound was dressed on the seventh day. No bleeding was discovered. On the eighth and ninth days a considerable amount was noted, also a considerable amount in the urine.

Calcium chloride, 15 grains, was then given intravenously, also calcium lactate, 5 grains, were given t.i.d. by mouth. The bleeding was checked for eighteen hours, then recurred and continued for two days in spite of the continued use of both calcium salts.

On the thirteenth day the small thin rubber drain was removed and the lower encircling tension suture sustaining the kidney was loosened and retied tightly over a fresh bolster of gauze. Bleeding at once ceased and did not recur.

It would appear that the early bleeding into the kidney pelvis was the result of the yielding of the plain catgut used to approximate the cut surface of the kidney, and therefore chromicized catgut of the same size should be substituted for it. Bleeding from the lumbar region did not occur until the eighth day, which suggests that its source was the traumatized kidney tissue of the lower pole. As calcium salts were given a fair trial, but failed to check hemorrhage permanently, and as the steadily increasing hemorrhage was immediately and permanently checked both internally and externally by tightening the silk sutures encircling the lower pole, the value of the removable and encircling sutures under these circumstances would seem demonstrated.

### Discussion

DR. LOUIS CARP: If the nephrotomy incision is made to one side of the midline of the kidney it will be less apt to bleed. Dr. Beer uses an excellent method to help control hemorrhage in closing a nephrotomy incision: he passes chromicized catgut mattress sutures through pieces of excised subcutaneous fat or muscle placed on either side of the nephrotomy incision. This makes possible drawing the suture tight and prevents it from cutting through the kidney substance.

DR. FREDERIC W. BANCROFT: Dr. Bissell has brought out some interesting points. The difficulty in nephrotomy has always been the hemorrhage. Kelly demonstrated the value of incising the kidney 1 cm. posterior to the median line; also he advised cutting by inserting a heavy wire deep in the parenchyma of the kidney and drawing it upward so that the vessels are pushed aside, instead of the method usually pursued of cutting with a sharp knife from the surface toward the pelvis. Dr. Bissell's plan of having stay sutures which may be applied as a tourniquet should late hemorrhage occur is undoubtedly of great value.

DR. BISSELL (closing): It was stated in my paper that plain catgut was used to approximate the cut surfaces of the kidney but since the internal bleeding which occurred on the fifth day, as evidenced by blood in the urine, was thought due to the plain catgut giving away early, I considered that chromicized catgut should be used instead. External bleeding, as evidenced by the escape of blood from the lumbar incision, arose from the extensive traumatized area on the convex border, which was found firmly adherent to the abdominal wall. The silk sustaining suture, when tightened over the lower pole, brought the traumatized surface up firmly against the abdominal wall and prevented hemorrhage from that source at the same time checking internal hemorrhage which also must have arisen from the lower pole.

### PRESENTATION OF CASES

#### MULTIPLE OPERATIONS AND INTESTINAL ANASTOMOSES

LEO BUERGER, M.D.

This is an exceedingly interesting, but not very gratifying, case of multiple surgical

interventions in a woman of twenty-nine years who has undergone fourteen major operations during the last fifteen years. Of these, two were operations on the kidneys, twelve were laparotomies. She has had two gastroenterostomies and five enteroenterostomies. She is still far from being relieved of her symptoms, and it is with the hope of obtaining enlightenment as to what should be done in her case or in similar cases, that I am presenting, in as brief a manner as possible, the maze of technical procedures that her suffering has led other surgeons and myself to undertake.

She is now, and has been for years, the victim of an intense and extensive intraperitoneal adhesive process, with chronic gastrointestinal obstruction; and whatever its origin may have been, it has resulted and is still resulting in the necessity for repeated operative exclusion of more and more intestinal territory. Whither it will lead, only the future can tell. Here, in brief, is her story:

At the age of ten, she had dysentery which lasted about four weeks, followed by constipation, pyrosis, nausea and occasional vomiting after meals (1908, in Europe). Because of constipation, indefinite gastric symptoms and indefinite abdominal pains, especially referable to the left lower abdomen, she was admitted to the Beth Israel Hospital, New York, December 1912, where an exploratory operation was performed (Dr. Bandler).

*Operation 1.* A cyst of the left ovary was found. The left broad ligament was shortened, the cyst was punctured and the appendix was removed.

In July, 1913 (Mt. Sinai Hospital) the case was diagnosticated as one of juvenile tabes, paresis and hysteria.

The symptoms subsided for a very short time, but pain in the right lower abdomen soon developed, followed by constipation and gastric symptoms. A new manifestation was pain in the right lumbar region with urinary frequency, nocturia and hematuria. Roentgenograms were negative. Because of the aforementioned symptoms, she was admitted to the Beth Israel Hospital in December, 1915.

*Operation 2* was performed by Dr. Goodman. The right kidney, found enlarged, was explored. There were no calculi. Decapsulation was carried out. This operation seemed to relieve the urologic symptoms, but the abdominal



symptoms persisted. Because of these a third operation was performed.

*Operation 3* was done at the Beth Israel Hospital, January 28, 1916 (Dr. Goodman). The findings were adhesions in the region of the cecum, binding this to several loops of small intestine and omentum. There were several large peritoneal glands, the nature of the enlargement was not determined. The adhesions were liberated.

Two weeks after the operation a sinus developed, which was suspected of being an "intestinal fistula." These are the data obtainable from the hospital records.

*Operation 4.* At the Beth Israel Hospital, February, 1916 (Dr. Isaacs), the fistulous tract was excised and found to end blindly. The pathological report was chronic inflammation.

In July, 1916, the patient was at the Mt. Sinai Hospital, where Dr. Beer diagnosed the case as one of abdominal adhesions, and *tabes dorsalis*, but no operation was performed.

In 1917, she complained of left lumbar and diffuse abdominal pain, and gave a history of having passed several calculi. Roentgen-ray examination of the urinary tract (Beth Israel Hospital) was negative. Cystoscopy, however, revealed a "stricture" in the right ureter, 6 inches from its orifice in the bladder. The left kidney was catheterized and found negative. At about this time the lower right abdominal wound opened, discharging purulent fluid. The abdominal and gastric symptoms, as well as the pain in the left lumbar region were present as before. In addition, dysuria, urinary frequency, nausea and vomiting were among her complaints.

With these symptoms the patient came to me January 22, 1918. Upon cystoscopy no flow from the right kidney could be obtained. The left kidney was catheterized and found negative. Pyeloureterography demonstrated marked tortuosity of the right ureter.

*Operation 5.* At the Polyclinic Hospital, March 9, 1918, I dissected out the abdominal sinns and the patient was discharged with the wound healed.

The pain in the left lumbar region persisted until May 10, 1918, when at cystoscopy retention was found in the left kidney. The pyelogram revealed dilatation of the extrarenal pelvis. In June, 1918, the case was again diagnosed (Mt. Sinai Hospital) as one of

*tabes dorsalis* and congenital lues. The Wassermann reaction was negative.

*Operation 6.* Because of the persistence of symptoms in the left kidney and the apparent excessive suffering of the patient, the sixth operation was performed by me at the Polyclinic Hospital, October 5, 1918. Findings were slight hydronephrosis and angulation of the ureter; operation, nephropexy and decapsulation.

*Operation 7.* Anorexia, vomiting and constipation as well as epigastric distress persisted, and the patient submitted to operation 7 (Mt. Sinai Hospital), January 6, 1919. An exploratory laparotomy was done by me and massive adhesions were found throughout, especially about the cecum and small intestine; these were liberated.

The gastric symptoms and persistent vomiting finally became so severe, that the patient was readmitted for operation.

*Operation 8* at the French Hospital, June 13, 1919. It was evident that evacuation of the stomach was impossible because of angulation of the duodenum, pylorus and first part of the jejunum, wherefor a posterior gastroenterostomy was performed (by me). The adhesions were liberated, and the patient was discharged considerably improved, but complaining of slight epigastric distress. In October, 1919, she gave a history of pain in the left lumbar region and epigastrium, and operation seemed indicated.

*Operation 9.* Laparotomy for postoperative adhesions (Beth David Hospital, October 30, 1919). The transverse and ascending colon were markedly distended, but there was no apparent obstruction in the region of the splenic flexure or descending colon. The stomach was free and bound down by surprisingly few adhesions. The stoma of the gastroenterostomy was patent and admitted two fingers very readily; there was no kinking of the jejunum, but there were extensive dense adhesions in the ileocecal region and kinking of the ileum and cecum at the ileocecal junction, the cecum apparently retroperitoneal. The omentum and inflammatory bands were adherent to an infantile uterus. The adhesions were freed, some omentum was resected, and the normal anatomical relations of the ileum, cecum and ascending colon were established. The free edge of the visceral peritoneum was sutured to the cecum and ascending colon. The trans-

verse colon, which was also rather redundant, was placed over the small intestine.

*Operation 10.* In November, 1919, the symptoms of intestinal obstruction again manifested themselves and operation was performed December 16, 1919 (at the Beth David Hospital by me), enteroenterostomy for adhesions and obstruction.

In April, 1920, she gave a history of vomiting and obstructive symptoms, but was able to retain some nourishment and the bowels responded to enemas. From then on the symptoms became more marked.

*Operation 11* was undertaken January 12, 1921 (Beth David Hospital). I performed an anterior gastroenterostomy and enteroenterostomy for intestinal obstruction. The old gastroenterostomy and enteroenterostomy stomas were patent; several loops of small intestine adhered to the anterior abdominal wall and there were many kinks and adhesions between loops of gut. (A loop of gut distal to the enteroenteric stoma of the previous operation was dilated.) A loop was brought up and anastomosed to the anterior surface of the stomach. The gastroenterostomy was then followed by an enteroenterostomy and anastomosis of the dilated loop of gut with its collapsed portion. She was discharged February 2, 1922, much improved.

In November, 1922, symptoms such as previously complained of were diagnosed (Dr. Held) as being "due to adhesions of the stomach and possibly to gastrojejunal ulcer."

*Operation 12* was performed ten months later at the Beth David Hospital (by me). An enteroenterostomy was carried out to relieve intestinal obstruction. The stomach was found dilated; the anterior and posterior gastroenteric stomas were wide open, the enteroenteric stomas well open, and the upper loops of the jejunum distended. At one point there was a sharp kink due to dense adhesions. The adhesions were scant in the upper abdomen, but more profuse in the lower abdomen. A lateral anastomosis was done between a loop of distended and an adjoining loop of collapsed gut. On December 31, 1922, she was discharged in good condition, vomiting being absent.

*Operation 13* became necessary on January 16, 1924 (at the Beth David Hospital). A sharp kink was discovered in a loop of ileum, one limb being collapsed, the other distended.

A lateral enteroenterostomy was done. On January 25, 1924, it was noted that the abdomen was distended and at times flat. Vomiting finally ceased and the patient was well for nine months after the operation.

*Operation 14.* Gradually increasing severity of symptoms, distention of the abdomen and cramps in the abdomen led to the fourteenth operation which was performed by me at the Beth David Hospital April 23, 1926. There were found dilated and collapsed loops of small intestine with angulation due to adhesions. Enteroanastomosis was carried out.

The patient remained comfortable after this operation for a period of several months. Laterally the abdomen is again beginning to protrude, although there is not the drum-like and tense belly characteristic of obstruction.

If we summarize the operations there were: first, the initial exploratory operation; second, the operations on the kidneys; third, the operation for the fistula; and fourth, the operations for gastrointestinal obstruction.

We have no data on the existence of the adhesions at the first operation. The first of the kidney operations on the right kidney did not seem to be any more essential than the second one done on the left. The history of passing stones is at least doubtful. Evidences of adhesions and peritonitis seemed to exist already in 1916, when the abdomen was explored and a sinus developed. Then two operations were done for this (the second one by me), resulting in closure of the sinus. But little of the peritoneal cavity was opened at that time, so that the extent of the adhesive peritonitis was not determined. I have performed, in all, ten operations on this girl, nine of which were laparotomies.

I must confess that the operation on the left kidney, in spite of the slight hydronephrosis and angulation of the ureter does not seem to have been altogether warranted, since the left-sided pain may have been referred from the intra-abdominal condition.

Eight laparotomies have been done by me since 1919, in a period of eight years. Recovery after each has been good, but not complete. Obstruction develops gradually, and, today, twenty-two months since the latest operation, she has abdominal distention and more frequent vomiting, and bids fair to become a candidate for additional surgical onslaughts.

(No discussion)

## COMPOUND FRACTURE OF THE TIBIA WITH OPEN KNEE JOINT

JOHN H. GARLOCK, M.D.

T. M., boy, aged five years, was struck by a truck, one wheel of which passed over his right leg. He was immediately admitted to the Second Surgical Division of the New York Hospital, March 22, 1926. He was in moderate shock. Below the inner side of the right knee was an irregularly shaped transverse laceration opening into the joint. The soft parts showed considerable crushing. There was another irregular laceration over the middle of the tibia with crushing of the skin and muscles. The periosteum of the tibia was stripped for a distance of 4 inches. Operation was performed soon after admission. The knee wound was thoroughly scrubbed and irrigated with saline solution followed by ether. Iodine was applied to the skin and subcutaneous tissues, care being taken not to allow any of it to enter the joint. The wound was thoroughly debrided and the capsule was closed with chromicized catgut. The skin was sutured with silkworm-gut without drainage. The leg wound was treated in a similar manner. A longitudinal incision was made and a large hematoma in the muscle planes was evacuated. All traumatized muscle was excised. The ends of the fractured tibia were removed with rongeurs. The wound was then again irrigated. The fractured ends were fashioned into a mortise arrangement and held in this position by a strand of kangaroo tendon placed about the tibia. The fascia was then sutured with chromicized catgut and the skin was closed without drainage, using silkworm gut. A plaster cast was then applied, extending from mid-thigh to toes.

The postoperative course was uneventful except for a sharp rise in temperature to 103° F. on the second day. It rapidly came down to normal. A window was cut in the cast and, on the sixth postoperative day, it was noted that the skin edges of the leg wound showed some necrosis. The knee wound had healed by first intention. The necrotic skin edges were excised and this wound then rapidly healed. Three weeks after operation, the cast was removed and it was found that there was soft callus at the site of fracture with slight posterior angulation. A posterior molded splint was applied, correcting this angulation and placing

the knee at 45° flexion. Three weeks later, a new splint was applied with the knee in the extended position. The patient was discharged from the hospital, two months after admission, walking on the plaster splint. He received no physical therapy.

At the present time, there is normal motion in the knee joint, there is no shortening of the leg, and the patient walks without any limp.

(No discussion)

## COMPOUND FRACTURE OF THE RIGHT TIBIA WITH OPEN KNEE AND ANKLE JOINTS. LATE RESULTS

JOHN H. GARLOCK, M.D.

G. K., male, aged thirty-six years, was shown before the Section of Surgery at the May, 1926, meeting, as an early result. It was then seven weeks after operation. At that time, there was complete extension at the knee, and flexion to a right angle with about 50 per cent impairment in the ankle joint. The patient was then able to get about with the aid of crutches.

On February 18, 1926, his right leg was caught in the revolving blades of a washing machine which he was repairing. He was admitted to the Second Surgical Division of the New York Hospital, service of Dr. Pool, and operated upon immediately. There were found multiple lacerations of the leg and a transverse laceration at the inner aspect of the knee joint which was open. The internal tuberosity of the tibia had been removed in an oblique manner by the accident, along with about two-thirds of the internal meniscus. There was another laceration at the inner aspect of the ankle, exposing the joint proper. The internal malleolus was missing. There were numerous lacerations of the leg exposing the tibia for a distance of three or four inches. After thorough preparation of the wounds with prolonged irrigation, scrubbing, flushing with ether, etc., a thorough débridement was done. The capsule of the knee joint was repaired with chromicized catgut, and all the wounds were closed without drainage. Active motion was started on the fourth postoperative day. The patient was allowed out of bed on the eighteenth postoperative day, and was discharged a month after operation to the out-

patient department, where he received a prolonged course of baking and massage.

At the present time, all the wounds are healed, there is normal motion in the ankle and knee joints, which are perfectly stable, and the patient is able to get about without the aid of any support.

(No discussion)

## COMPOUND FRACTURE OF THE TIBIA. EARLY PEDICLE SKIN GRAFT

JOHN H. GARLOCK, M.D.

P. McA., male, aged fifty-one years, on July 22, 1925, while getting off a tug, caught his right leg between the bow and a post on the dock, receiving a crushing injury. He was admitted to the New York Hospital in considerable shock. At operation, a few hours later, after he had come out of his shock, there was found a 2-inch transverse, lacerated wound along the inner side of the right leg at the junction of the middle and lower thirds, with two similar wounds anteriorly, and one on the outer side. The skin, for a distance of 6 inches around this area, was obviously not viable. After exposure, it was found that all the muscle and subcutaneous tissues along the inner and posterior aspects, were severely crushed. The posterior tibial vessels were divided, but the posterior tibial nerve was intact. The tibia was fractured in a spiral manner with long anterior and posterior fragments. The anterior tibial vessels appeared to be intact.

The procedure consisted in a complete débridement of all the soft parts, including the traumatized skin. This left a gap 5 inches in width, extending around the inner and posterior aspect of the leg. The tendo Achillis was intact. A strand of kangaroo tendon was placed around the fractured site. The wound was left wide open and a posterior molded splint was applied. A note made at that time read: "It is questionable whether the circulation of the foot will remain good, but with the apparent absence of injury to the anterior tibial vessels, it is thought best to give the patient a chance to reestablish the circulation in the part."

The convalescence was relatively uneventful. The wound was dakinized. Circulation of the foot remained good. The temperature never went above 101° F. Three weeks later, the cast was removed. It was found that union

was fairly firm. The wound was clean. On September 1, about five weeks after operation, it was found that union was firm, and alignment of the fragments was good. The wound consisted of a granulating area along the anterior and internal aspect of the leg, measuring 6.5 cm. by 12 cm. It was decided to cover the raw area with a pedicle skin flap from the opposite leg. On September 8, a tubular graft was made on a posterior aspect of the left leg. This measured 13 cm. by 7.5 cm. The skin edges on the lateral sides were undermined and brought together beneath the tubular graft. To relieve tension, multiple scarifications were made on either side. Circulation of the graft remained intact. Nine days later, a rubber band was tied around the upper end of the graft for fifteen minutes. This was repeated on two successive days, increasing the time of compression. Twelve days after the first operation, the second stage was performed. The area to be covered was curetted and the edges were freshened and undermined. The upper end of the pedicle was divided transversely. The line of suture on the graft was excised and the graft was "cored" out. It was found to measure 12 cm. by 7 cm. In order to guard against necrosis of the distal end, the terminal  $\frac{3}{4}$  inch was excised. The left leg was then placed in front of the right leg and the graft sutured into place for three-quarters of its length. A plaster cast was applied from the toes to mid-thigh. Daily dressings were done through a window in the cast. The graft healed by first intention. Eleven days later, the third stage was done. It was found that the area from which the graft had been taken on the back of the left leg presented a granulating wound where the skin edges had separated. There still remained two inches of wound to be covered. The base of the graft was divided and was sutured to the remaining raw area. The granulating area in the back of the left leg was covered with Thiersch grafts. All wounds healed, and the patient was discharged October 19, 1925, three months after the receipt of the injury. He received a course of physical therapy in the outpatient department.

At the present time, one year and eight months after operation, examination shows that the fracture is united, there is no shortening, motion in the ankle joint is practically normal, and there is no circulatory disturbance

of the foot. The graft is flat, well padded, and shows a return of sensation.

*(Discussed with the next case)*

### COMPOUND FRACTURE OF THE TIBIA. LATE PEDICLE SKIN GRAFT FOR ADHERENT TENDER SCAR

JOHN H. GARLOCK, M.D.

D. U., boy, aged four years, was first admitted to the Second Surgical Division of the New York Hospital on September 12, 1925, with a history that half an hour before he was run over by a taxicab, two wheels passing over his left leg. He had a compound fracture of the left tibia and fibula with avulsion of the skin over a distance measuring 2 square inches. Soon after admission a débridement was performed and it was found that there was a transverse fracture of the tibia and fibula. The wound was left wide open in order to be dakinized. A posterior plaster splint was applied. On the third day after operation, examination showed that the fragments had slipped. The wound was clean. The fragments were readjusted and another plaster splint was applied. Fragments again slipped. The attempt was made to apply traction by overhead extension and later by using a Thomas splint with a Sinclair skate. This was unsuccessful because we were unable to control the patient. On September 24, 1925, twelve days after the original operation, the patient was taken to the operating room and the wound was found to be clean. The fragments were notched and a kangaroo tendon suture was placed around the bone. A plaster cast was applied, incorporating a metal band posteriorly. The wound was dakinized, healing slowly. The boy was discharged January 2, 1926, without shortening, but with slight external bowing, and wearing a brace. The wound had not yet healed.

He was admitted again to the hospital six weeks later. There was an irregular granulating area, measuring 6 cm. by 10 cm., over the front of the tibia. Bony union was firm. The wound was dressed daily and was practically healed when the patient was discharged on March 12.

The patient was readmitted to New York Hospital on October 11, 1926, with a thin scar over the front of the left tibia adherent to the bone. The patient's mother stated that on the slightest injury, this scar broke open and healed

very slowly. It was decided to excise the scar and cover the raw area with a pedicle flap from the opposite leg. On October 14, a tubular graft was prepared on the back of the right leg, in such a fashion that the length was to the width as three is to one. The skin edges remaining, after the flap was lifted, were undermined and brought together with silkworm gut sutures beneath the flap which was fashioned into a tube with skin surface outward. The subcutaneous fat was included in the graft. Seven days later, a rubber band was tied around the upper end for two hours. On the following day, it was applied for four hours. On October 23, nine days later, a second stage of the operation was done. The scar over the front of the left tibia was excised. The upper extremity of the tube flap was divided transversely. The right leg was placed in front of the left, the tube was opened, and the excess fat was cored out. The flap was then sutured into the deficiency over the front of the left tibia for two-thirds of its length, beginning at the lower end. A circular plaster cast was then applied, holding the two extremities in their new position. Through a window cut in the cast, dressings were performed daily. The third stage was done twelve days later. At this time, the distal end of the flap was cut away from its base and the remaining raw area over the front of the left tibia was covered by the remainder of the flap. The flap healed by first intention and the patient was discharged from the hospital on November 19.

At the present time, there is no shortening, and over the front of the tibia the skin is not adherent and withstands ordinary trauma.

### Discussion

DR. MORRIS K. SMITH: I would ask Dr. Garlock if he had much trouble in the after-care of the patient. I am interested in this case because I once did a pedicle grafting in a case of a large leg ulcer, taking the graft from the front of the thigh and placing the ulcerated leg across the opposite knee. The graft took satisfactorily but I always felt that if the patient had not been very cooperative and willing to put up with considerable discomfort the same result would not have been accomplished.

DR. HOWARD LILIENTHAL: I note that in all these cases Dr. Garlock seems to have believed in the advantage of complete débridement, so frequently brought out during the late War, and I wonder whether his subsequent proce-

dures would have been possible without it. I think the value of this treatment is very well worth mentioning.

DR. JOHN V. BOHRER: I would ask Dr. Garlock how he closed the knee joint. Did he have enough capsule, or was the defect filled in with soft tissue?

DR. FREDERIC W. BANCROFT: I have seen a similar condition following osteomyelitis where the primary incision was placed over the crest of the tibia. The result was a thin epithelization attached closely to the bone, which would bleed on any trauma. In this case it was possible to excise the scar and undermine the lateral surface of the skin and fat so that skin and fascia could be sutured over the defect. I wonder if in Dr. Garlock's last case he could not have followed a similar procedure.

DR. GARLOCK (closing): In answer to Dr. Smith, I can say that no difficulty was encountered with either of these patients, from the standpoint of comfort. The leg from which the skin graft was taken, was separated from the opposite leg by the interposition of sufficient padding. It was not a question of holding one leg away from the other, but rather of having one rest directly upon the other.

As regards Dr. Bohrer's question, relative to the capsule of the joint, there was some tension, but by the use of mattress sutures I was able to close the joint completely.

In answer to Dr. Bancroft, we considered the procedure he suggested, but at the time of operation, we were glad we had decided upon a skin flap, because an attempt was made to undermine the skin edges to determine the amount of tension necessary to close the defect without the graft, and it was found that a gap of about one-half inch would still remain.

Dr. Lilienthal's remarks on débridement are important. The object in showing these cases was to illustrate primarily, the principle of débridement as applied to injuries in civil life. On the Second Surgical Division of the New York Hospital, we have a tendency more and more, to suture these compound fractures and joint injuries without drainage, after a complete débridement. We feel that the preliminary preparation of the skin and wound is just as important as the débridement itself. This preliminary procedure consists of thorough scrubbing with soap and water, followed by a prolonged irrigation with saline solution, drying, benzine, thorough flushing with ether, and then

thorough application of iodine. In injuries involving synovial membranes, we are careful not to have the iodine come in contact with these structures and in the majority of the cases we close them without drainage.

## ARTHRALITH OF UNUSUAL ORIGIN IN THE KNEE JOINT

JOHN H. GARLOCK, M.D.

M. D., male, aged seventeen years, was first admitted to the Second Surgical Division of the New York Hospital September 29, 1926. He complained of inability to extend the right knee. One month previously, while playing football, he wrenched this joint. For several days following this injury, the knee was swollen and painful. When the swelling had subsided, the patient found that he was unable to extend his knee completely. This disability persisted up to the day of admission to the hospital. Except for the few days following the injury, he was able to walk about without difficulty and without pain.

The entire knee was swollen and there was clinical evidence of fluid within the joint. Complete extension lacked 20°. Flexion was impaired about 10 per cent. On motion, a distinct click was felt within the joint. The lateral ligaments apparently were intact. There was distinct tenderness over the internal meniscus. Roentgen-ray examination showed a calcified foreign body in the anterior compartment of the knee.

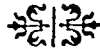
Operation was performed September 30, 1926. A long mediolateral incision was made. It was found necessary to divide some of the fibers of the vastus internus muscle. The deep fascia and the capsule of the joint were divided in the line of incision. With the patella displaced laterally, and the knee flexed, it was possible to obtain an excellent view of the anterior compartment of the joint. It was then seen that on the inferior surface of the internal condyle was a cup-shaped depression, to the posterior rim of which was attached an irregular piece of cartilage and bone measuring 2 cm. by 3 cm. by 3.5 cm. This hung down between the tibia and femur in the region of the crucial ligaments. It was evident that the patient had sustained a fracture of the cartilage of the lower end of the femur and the broken-off fragments formed the foreign body which had been visible in the roentgenogram.

The joint contained a moderate amount of serous fluid. The synovial membrane was reddened and somewhat thickened. The fragment was removed, and the joint was flushed with ether. The capsule was then closed with interrupted catgut sutures. The vastus internus and fascia were sutured and the skin was closed with silkworm gut. Convalescence was smooth. Motion was started on the fourth postoperative

day. The patient was allowed out of bed on the twelfth postoperative day. He was discharged from the hospital October 17, seventeen days after operation.

At present, four and a half months after operation, there is normal motion in the knee joint and the patient is able to get about without any difficulty.

(No discussion)



[SURGICAL SUGGESTIONS]

AFTER tapping a hydrocele palpate the testis and epididymis to exclude neoplasm.

THE so-called sarcoma of the testicle is usually a carcinoma, although true sarcomata are occasionally encountered. The myeloid, embryonal carcinoma, also called seminoma, while definitely malignant, is cured by simple orchidectomy in about 20 per cent of the cases; while abdominal metastases appear to respond to roentgen therapy.



# TRANSACTIONS OF THE SECTION OF GENITO-URINARY SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of February, 16, 1927*

THE CHAIRMAN, DR. FREDERICK T. LAU, PRESIDING

## COMMISSURAL PROSTATIC HYPERTROPHY

With Lantern Slide Demonstration

Not prepared for publication

ALEXANDER RANDALL, M.D.

PHILADELPHIA

(by invitation)

A DISCUSSION was presented of the origin and location of prostatic hypertrophy, citing the works of Tandler and Zuckerkandl, Albarran and Motz, Motz and Perearneau, Lowsley and others, pointing out that there had been a tendency to dogmatize that the hypertrophying prostate consistently had its origin of growth in only one location and that the above authors disagreed as to this location.

From a personal series of 1218 autopsies studied, conclusions had been drawn that it was impossible to correlate the findings with the idea that hypertrophy invariably originated in or at one fixed area. Hypertrophy may originate in any lobe of the prostate with the exception of the true posterior lobe. If such were the case, the findings from this autopsy series could not help but give definite types of hypertrophy according to its origin. In other words, one should find individual specimens illustrating lateral lobe hypertrophy, hypertrophy in the posterior commissural glandular tissue, hypertrophy in the subcervical gland of Albarran, or combinations of any or all of these. Lateral lobe hypertrophy had been always bilateral, in Dr. Randall's experience, though at times one lobe had acquired greater growth than the other:

he had found specimens in which middle lobe hypertrophy was present without lateral lobe enlargement. Further, this middle lobe hypertrophy partook of a different contour according to whether the origin was in the posterior commissural tissue or in the subcervical gland of Albarran. In other words, there are two gland elements anatomically present in the mid-line posteriorly, either of which may undergo hypertrophy independently of the other, or independently of lateral lobe growth, and they present a picture allowing of their recognition preoperatively by the cystoscope, or at the operating table. The differential diagnosis between these types was described according to the differences cystoscopically as well as by rectal examination.

There are differences of surgical handling of these cases according to the type of hypertrophy present. Preoperative recognition should alter the surgical approach in order to cause the minimal amount of damage, allow of a clean enucleation and minimize the likelihood of postoperative bleeding. These factors likewise could not but influence the completeness and permanency of cure, and decrease a definite postoperative morbidity which has so regularly followed prostatectomy.

*In the suprapubic operation* (a) where only bilateral hypertrophy is present, each lobe should be separately enucleated; (b) where there is hypertrophy in the lateral lobes and also in the posterior commissure, enucleation starting about one lobe should follow the line of the false capsule under the posterior commissure and across the mid-

line and the apex of the trigone, and thence directly into the line of cleavage and about the opposite lateral lobe, the hypertrophic tissue to be thus removed in one mass; (c) where there is hypertrophy of the subcervical glands, it being recognized that such lie without the normal prostatic capsule and covered only by mucous membrane, such a lobe could be immediately pinched off from its pedicle without further manipulation.

In *perineal prostatectomy* the same rules hold true in regard to separate or total adenectomy according to whether there is hypertrophy only in the lateral lobes, or in the lateral lobes and the posterior commissure. When the operation is by the perineal route, one should not fail to look for, recognize, and remove a coexisting subcervical hypertrophy, remembering that it would not be removed from within the capsule and oftentimes lies as an intravesical projection free of any attachment to other hypertrophied gland tissue.

As the normal histology presents two masses of gland tissue lying in the midline, and presenting so-called middle lobes when hypertrophied, but having separate origin and separate anatomical encapsulation and a differing surgical significance, we should in the future eschew the use of the term middle lobe and speak of such growths as arising either from hypertrophy of the posterior prostatic commissure or from hypertrophy of the subcervical gland.

### Discussion

DR. EDWIN BEER: It is always interesting to hear Dr. Randall for he has always something new to say and usually something convincing. Whether tonight is the exception to the rule, I do not know. I notice he was not entirely convinced himself, for in the presentation of his charts, he spoke of middle lobes though he was trying to get away from this nomenclature and talk about commissural hypertrophies. Is it a wise change to favor commissural instead of middle lobe? I doubt it, for one would be forced to talk about a posterior commissural hypertrophy if one wished to refer to that which has been called middle-lobe hypertrophy as

there are two commissures at the badder neck. This surely is not as simple as speaking of middle lobes.

The Albarran glandular hypertrophy as a clinical entity is a rarity here. I do not think that 2 per cent of the cases of prostatic involvement that come my way for operation are of the Albarran type. If we dismiss that type, I believe what Dr. Randall said is absolutely borne out by my experience. I believe that Zuckerkandl and Tandler hit the nail on the head in their studies in which they called attention to the fact that all the adenomatous masses develop anterior to the ejaculatory ducts though not always from the middle lobe. They are often lateral in their origin as well as in the floor of the posterior urethra above the verumontanum.

The posterior lobe becomes compressed against the capsule as the middle and lateral lobes develop their adenomas.

Whether it is so important in the surgery of lateral and middle lobe enlargement to know exactly what we are going to encounter before we start operating, I doubt. I believe we need an accurate picture if the approach is perineal, but for the suprapubic approach, I do not believe such an extensive preoperative study is essential even though we usually cystoscope all these cases.

The important thing to remember from this presentation is that in post-mortem studies the commissural, or middle lobe as we used to call them, adenomas start in much earlier than do those in the lateral lobe, and in the sixth decade, the two combined become the typical picture of prostatic obstruction.

DR. O. S. LOWSLEY: This is a real contribution to a subject that interests us all. Dr. Randall has made a study of a very large series of cases and it is most interesting to me that he has reached the same conclusions that I have held since I studied this subject first from the embryological, and later from the pathological point of view. My series comprised 250 cases, which is very much smaller than this wonderful series reported on by Dr. Randall. I agree with him absolutely in everything that he says. It is very seldom that I agree with anyone in everything on one subject; but I believe that hypertrophy may begin in any one of the four sections of the prostate, for we all feel certain that it does not occur in the posterior lobe. Dr. Randall said it becomes a compressed

structure, although in middle life it is of equal importance to the individual.

Dr. Beer is entirely wrong about our New York lack of subcervical group enlargement. I found that 23.7 per cent of the males over thirty years of age had more or less enlargement of the subcervical group. When the growth is small, these patients pass from office to office, from city to city, and are discouraged by the statement that they are nervous or neurasthenic and to "forget about it." They will be found to have subcervical enlargement, but are very seriously affected because they suffer from frequency of urination, and if they have to pass urine every hour or half hour during the night they would naturally become neurasthenic. One must examine them very carefully and look for a subcervical enlargement. The true middle-lobe enlargement is quite rare, as Dr. Randall pointed out.

Regarding operation: until Hinman's modification came out, it was my custom to do 40 per cent of these operations suprapubically for the simple reason that when the subcervical group took part in the disease I found we were better able to remove the mass in its entirety from above; but since using Hinman's modification, we find that we get such good vision of the bed and of the vesical orifice that we are able to approach the orifice much better, and are able in most instances to get out very large subcervical masses. We have recently removed a subcervical mass as big as a small lemon.

It is very interesting to me to have Dr. Randall subscribe so thoroughly to the views which I have suggested, primarily from the embryological standpoint; and I think the reason Tandler has changed his viewpoint is to make it fit the embryology which has been completely elucidated since he and Zuckerkandl wrote their quite remarkable contribution to this subject. Of course, their observations were accurate to an extent, but our embryological studies of the prostate have made it possible to explain the pathological conditions much more satisfactorily.

DR. H. H. MORTON: I wish to thank Dr. Randall for the privilege of hearing the best description of the pathological anatomy of the prostate that I have ever listened to. We have all of us accepted the theory of prostatic hypertrophy as expounded by Tandler and Zuckerkandl because of the weight of their names in pathology and urology. The theory is an attractive one, i.e., the hypertrophy

beginning in the subcervical portion of the prostatic glands and gradually encroaching on the healthy prostatic tissue, pushing it out of the way of the new-growing hypertrophic tissue until the old true prostatic tissue forms an enveloping capsule at the periphery with the newly formed hypertrophic mass enclosed within it.

We have held to this idea because we had no better one. Some three years ago I did some work on the pathological changes in hypertrophied prostates in Professor Bauer's laboratory in Vienna, and we could not make the facts, as we saw them through the microscope, fit in with the Tandler and Zuckerkandl theory. We found the hypertrophy of tubules and muscular fibers extending all through the prostate in all of its lobes, and we failed to find the thinned-out remains of the original prostate at the periphery. At that time we had no real explanation of our findings, but tonight, in his beautiful demonstration, Dr. Randall has clearly shown what we had suspected but were not sure of, namely, that the hypertrophic change in the prostate may be universal and not confined to one particular group of glands, or it may affect only one limited part of the gland.

Dr. Randall's explanations have also been most helpful in directing the logical surgical approach for the removal of hypertrophied prostate, and he has shown how important is the study of the form and direction of the hypertrophy before deciding whether the prostate should be approached through the perineum or from above.

DR. JOHN MORRISSEY: Supplementing Dr. Randall's exhibition, I would like to exhibit a specimen from a case that I operated on four weeks ago. The patient was a man forty-two years of age who had suffered from retention for five years, and had had a Young's punch operation three years ago; he was relieved of his retention for a time, but it returned, and when I saw him three months ago the residual urine was again 16 ounces. I did a Young's punch operation on him at the time without much benefit and he bled for three months after the procedure. He then went into the hospital and by perineal prostatectomy I removed this specimen, a good-sized posterior lobe growth. While it does not correspond to the Albarran type, still when it was taken out it was in a lamella of its own, separated from the two lateral lobes. The bladder did not empty itself until this was removed. You can

see on the upper surface a small indentation where I took out a fair-sized piece when I did the Young's punch operation.

I have not had much luck with the Young's punch operation, and many others complain of the same lack of success; I think it is due to the fact that these cases are not properly selected. This may occur in cases which should be subjected to a prostatectomy, and not have a Young's punch operation; yet when that is carried out and the symptoms continue, the failure is charged against the punch operation. Within the past ten days I have used Dr. Dr. Braasch's instrument in two cases, one with 6 ounces of residual urine and the other with 11 ounces residual; and while they are only seven and nine days old the cases have done very well. That is the procedure where, after the removal of the obstructing portions, the prostatic area is fulgurated, as advised by Dr. Bumpus, and all bleeding is checked in that way. That disposes of the difficulty in the Young's punch operation. I think it requires nice judgment to decide whether the case is one in which to use the Collings' operation, or one in which the obstruction can be removed with the Braasch or Young's punch operation, which requires a radical procedure with complete removal of the obstruction, or as I have done in this case.

DR. H. JECK: Dr. Randall laid stress on the preoperative study of cases of prostatic hypertrophy which would determine largely the type of operation. I hope he will tell us more of the particular type of operation he employs for each type of obstruction. Dr. Lowsley mentioned the enlargement of the subcervical group in young men who are called neuroasthenics. I wish he would tell us how he recognizes that type of subcervical group enlargement. What is the cystoscopic picture and just what does he do for them?

DR. CLYDE COLLINGS: It was my privilege in 1920 to spend a month with Doctor Randall in Philadelphia. I want to recommend to all of you who have the time and opportunity to visit his clinic and see his wonderful collection of museum specimens; one sees there ten or fifteen examples of every type of prostatic obstruction that occurs.

DR. F. T. LAU: There is no question of the absolute importance of a good cystoscopic study and thorough knowledge of prostatic or commissural enlargement before we decide what type of operation to use.

DR. RANDALL (closing): Dr. Beer has caught me in my weak point and quite properly criticized my referring to middle lobes while speaking of my lantern slides. It is purely a bad habit from past usage, and my attempt this evening to differentiate them for you being in my own mind a question of recent birth, I inadvertently slipped while speaking of the slides.

I must agree with Dr. Lowsley that the subcervical hypertrophies are far from infrequent and as I showed you in my statistics they form 30 per cent of the hypertrophies when occurring alone, and if combined with the bilateral enlargements, their frequency immediately augments that figure.

I was most interested in Dr. Morton's reference to his experiences while in Vienna and it somewhat explains the change of attitude which Tandler and Zuekerkandl have taken in the recent edition of their book.

What I was particularly anxious to dwell upon was the choice of variation of the operation according to the type of hypertrophy present. I am convinced that there are definite preoperative pictures to be diagnosed from the clinical, cystoscopic and rectal examination which will place each prostatic patient in a definite group and will classify him as to the type of hypertrophy present. For instance, we have all seen the individual with hypertrophy and sudden complete retention, whom indwelling catheter drainage for a few days or more will tide over the acute retention, and on removing the catheter he will again start voluntary urination and will be found to have little or no residual urine. This is the type which has only bilateral extravasial lobe hypertrophy. This could be proved by both rectal and cystoscopic examination and at operation two separate lobes will be found and should be separately enucleated. A second type will be the individual who over a period of years has been enjoying fair health, but when examined will be found to be carrying a large residual urine which no amount of preliminary treatment will vary. Such a case will in all probability present on rectal and cystoscopic examination, in addition to lateral lobe enlargement, hypertrophy in the posterior commissure. At operation such an hypertrophy should be removed as one mass which will include both lateral lobes attached to one another by the hypertrophic commissural tissue. In either of the above types suprapubic or perineal pros-

tatectomy can be successfully performed, though here I personally like to make a differentiation, removing the commissural enlargements suprapubically and the simple bilateral ones perineally.

Where the subcervical glands hypertrophy, I feel it is always best to approach such a case through the suprapubic incision because of the anatomical origin of the enlargement and the fact that such lobes are always intrasphincteric, as well as an intravesical. These, I grant, are refinements of diagnosis and operative technique which, though they are not absolutely essential, have decided influences upon conservative surgery, minimizing injury, offsetting hemorrhage, and giving greater assurance of permanency of cure.

## PRESENTATION of INSTRUMENTS

### A MODIFICATION OF THE McCARTHY PANENDOSCOPE FOR CONTINUOUS IRRIGATION

CLYDE W. COLLINGS, M.D.

We have modified McCarthy's panendoscope by placing a small metal tube from the inflow faucet down to the end of the sheath. A small groove on the obturator permits it to pass easily by this metal tube.

The purpose of adding this feature to the McCarthy endoscope is to get rid of the annoyance of stopping a urethral or bladder operation to remove the water from the bladder, which, too, interferes with the progress of the operation, for the electrode has to be adjusted again.

With continuous irrigation the inflow and outflow can be nicely adjusted so that the bladder is not overdistended. Also the bubbles from the high frequency current are washed away. The irrigating medium washes away any bleeding that may occur. Lastly, a constant degree of distention of the prostatic urethra and bladder may be maintained.

## PRESENTATION OF CASES

### THREE CASES OF PROSTATIC INTRUSION OPERATED UPON BY THE ELECTROTOME CUTTING CURRENT

CLYDE W. COLLINGS, M.D.

CASE I. W. B., aged sixty-one years, admitted to Lexington Hospital December 3, 1926 with a complaint of inability to pass urine.

Previous and family histories essentially negative.

Present Illness: In June, 1926, the patient began to wet the bed at night; he was passing his urine every half hour by day and night, with marked urgency. He has experienced much difficulty and burning for the past three years. Mouth very dry since the onset of present illness. He has been very nervous of late and the family thought the patient's "mind was going off."

On December 3, 1926, he was referred to Dr. Archie Dean at the Memorial Hospital. Because of the great loss of weight he was thought to have a carcinoma. Cystoscopy by Dr. Dean revealed a median bar at the vesical outlet, deep bas fond, and a marked elevation of the floor of the bladder neck as the urethroscope was withdrawn into the posterior urethra. Creatinine 2.5 mg.; non-protein nitrogen 90. Phenolsulphonphthalein test: trace in the first two hours. Urine very cloudy and loaded with pus. By rectal examination the prostate was found slightly enlarged, regular, firm throughout, with no suggestion of carcinoma. An indwelling catheter was tied in the urethra.

December 7, 1926, electrotome excision of prostatic bar, under caudal anesthesia. Indwelling catheter for three days after the operation. The symptoms of renal insufficiency were more marked for the first few days after the operation. After the removal of the catheter the patient has continued able to void.

December 13, 1926. Discharged from the hospital. N. P. N. 40; creatinine 1.5.

December 16, 1926, urinates three or four times at night, every two hours during the day, burning is about gone. Urine cloudy but not bloody. Voids 8 ounces at a time. Residuum 4 ounces.

December 21, 1926: Residuum 3 ounces.

December 27, 1926: Residuum 2 ounces. Urinates twice during the night, every 2 or 3 hours during the day.

January 3, 1927: urinates twice in the night, every three or four hours in the day. Residuum, 1 ounce. Blood pressure 160/100. Urine contains less pus.

January 17, 1927: Residuum 1 ounce.

February 16, 1927 (nine weeks after operation): Residuum  $1\frac{1}{2}$  ounces; indigo-carmin 5 c.c. intravenously appeared in ten minutes in fair concentration. Has gained 21 pounds.

CASE II. J. McG., aged seventy-eight years, admitted to Bellevue Hospital August 25, 1926.

Chief complaint: He passes all his urine through a suprapubic fistula since he was operated upon in Beth Moses Hospital, March 12, 1926—a suprapubic cystotomy for adenoma of the prostate. He was in such poor condition that he was sent home for several weeks.

On June 25, 1926, prostatectomy was performed at Cumberland Hospital. The suprapubic wound has never closed and he has never voided per urethram. The patient had gonorrhea forty-five years ago, chancre forty years ago.

On admission, rectal examination; prostatic bed flat, indurated, no nodules felt. Wassermann reaction, 2 plus. NPN 38; creatinine 1.8; blood pressure 140/75.

Operation, August 31, 1926. Spinal anesthesia. There is a band of scar tissue across the floor of the vesical outlet from five to seven o'clock with a moderate basal fold. The scar tissue was excised by making three incisions in the bladder neck, with the cutting high frequency current, at five, six and seven o'clock.

Following the operation the patient has been able to void continuously. The suprapubic fistula healed to a pinpoint opening but due to the dense scar tissue it refused to heal entirely.

October, 1926. The suprapubic fistula was excised. No obstruction to bladder neck was found. There was a deep groove posteriorly, apparently made by the cutting high frequency current. The bladder was closed tight. Indwelling catheter tied in the urethra for three days.

Wound healed per primam. Discharged October 29, 1926. General condition good. Residuum 15 c.c. Urinates every two or three hours in the day, two or three times at night.

February 16, 1927 (five and one-half months after operation). Residuum, none. Up once at night, rarely twice; urinates every three or four hours by day. Working every day. Has regained his normal weight and strength.

CASE III. J. K., aged sixty-seven years, admitted to Bellevue Hospital November 10, 1926.

Past History: One year ago the patient developed painful urination, relieved for six months by prescription.

Present Illness: Six months before admission

he developed complete retention and his Doctor prescribed a catheter which he uses two or three times a day and once at night. He came to the hospital because he gets spasms with terrific pain in the rectum referred down both legs.

Rectal examination: The prostate was somewhat enlarged, especially the left side, stony hard, fixed. It felt even harder on the right side. Diagnosis: carcinoma of the prostate. Urine negative except for a trace of albumin and clumped pus cells. NPN 39; creatinine 1.5.

November 23, 1926. Spinal anesthesia. Very difficult to introduce the McCarthy panendoscope. It required great depression of the ocular and a finger in the rectum to get the instrument by the carcinomatous bar across the vesical outlet.

Cystoscopy: No lateral lobe intrusion, a marked bar at six o'clock. A deep valley was cut in the bladder neck from five to seven o'clock to a depth of 2 cm. and extended as far back as the verumontanum. No bleeding. Indwelling catheter for three days. Following the removal of the catheter patient has not required catheterization.

November 30, 1926. Radium implantation under spinal anesthesia. Through an inverted U incision of the perineum, with a sound in the urethra as a guide, the prostate was exposed in the usual manner to the apex. The Young tractor was placed through the urethra into the bladder which gave good exposure. The lower part of the seminal vesicles was also exposed. Fifteen gold capsules containing about 1.5 mc. emanation each were placed in the prostate and lower seminal vesicles.

January 13, 1927. Rectal examination: the left lateral border of the prostate was very hard, the right felt normal. Residuum 4 ounces. Has gained 10 lbs. Up two or three times at night; during the day urinates every one and one-half to two hours.

February 16, 1926. Residuum less than 2 ounces.

### Discussion

DR. A. R. STEVENS: Dr. Colling's cases call for only favorable comment. He is able to get out more obstructing tissue than one usually gets with the ordinary Young's punch operation. In cases of carcinoma where one implants seeds of radium emanation, it is well recognized that although the carcinoma may

decrease in size afterward, one fails to get rid of the residual urine and consequently cannot cut down the degree of urinary frequency. It would seem that one must either do a Young's punch operation or open the patient suprapubically and by cutting or cautery remove a large part of the obstructing tissue at the vesical outlet. It seems to me that this method of Dr. Collings does that as well, if not even better, than one can accomplish it through a suprapubic opening, and the individual gets out of the hospital much more quickly.

DR. O. S. LOWSLEY: I wish to express approval of that part of Dr. Collings' report in which he does not approve of this method in adenopathy of the prostate. Of late years there has been a considerable amount of meddlesome surgery in these cases which later come to prostatectomy; they give the patient a false sense of security and cause the postponement of the removal of the prostate until he is in a worse condition to stand operation as regards his blood vessels, recurrence of residual urine, etc. In the Academy of Medicine some years ago, some one reported a palliative procedure of this sort, and called the patient cured, with residual urine of 8 ounces!

DR. A. L. DEAN: The first patient shown by Dr. Collings was referred to me with the diagnosis of carcinoma of the prostate. In addition to the details of his physical examination as recited by Dr. Collings, all of which indicate his precarious condition, there were 960 c.c. of residual urine. When my examination revealed no tumor, but an obstructing bar formation, I considered the patient ideal for the therapy at which Dr. Collings is so adept. When the patient was returned for my examination a few days after his operation the general improvement was striking. My impression is that this method is an excellent one when employed for the proper indications.

DR. A. HYMAN: I would like to supplement Dr. Lowsley's remarks concerning the use of this instrument in prostatic adenoma. I consider it a dangerous procedure to attempt intra-urethral excision of portions of the prostate when there is a large amount of infected residual urine. During the past year I know of two instances in which this was followed by serious consequences. One patient died from hemorrhage and sepsis and the other patient ran a very stormy course until relief was obtained by a suprapubic cystotomy. The type

of instrument presented by Dr. Collings is of undoubted value in the treatment of median bars or contracture of the neck of the bladder.

### BILATERAL HYDRONEPHROSIS AND HYDROURETER SECONDARY TO SPINA BIFIDA WITH CONGENITAL SPINAL CORD DEFECTS

CLARENCE G. BANDLER, M.D., F.A.C.S.

E. S., male, aged twenty-four years, was admitted to the N. Y. Post-Graduate Hospital October 25, 1926, on the service of Dr. Herman Mosenthal. The case is presented through his courtesy.

On admission the patient was in an ambulatory condition and his temperature, pulse and respiration were normal. The chief complaints were: 1. An ulcer on the sole of the left foot which had been present for one year. 2. Shrinking of the left leg and foot for six months. Both family and personal history were negative.

Past History: The patient was born with spina bifida. He had had no serious illnesses which had confined him to bed with the following exceptions: 1. Measles and scarlet fever in childhood. 2. Tonsillectomy seventeen years ago. 3. Operation on bladder twelve years ago at Bellevue Hospital; diagnosis unknown. 4. Influenza seven years ago. 5. He had always had urinary difficulties, consisting of lack of control; necessity for urination after every appreciable intake of fluid; difficulty in starting the stream and terminal dribbling. He has regularly voided once during the night. Venereal diseases were denied.

Physical Examination: Enlarged heart. Aortic dilatation. Moderate hypertension, evidenced by a blood pressure 172/90. Atrophy of the left leg and foot with 8 cm. shortening. A neurotrophic ulcer on the sole of the left foot. Spina bifida with failure of closure of the sacral arch. All abdominal reflexes present except the upper lateral on the right side. Slight secondary anemia, the erythrocytes being 3,900,000 with a color index of 1. Spinal fluid negative for cells, globulin, Wassermann and colloidal gold tests.

The subsequent course of events was rather interesting. For the next few days the patient was apparently comfortable, being up and about. Two days after admission, cystoscopy was performed as follows: A large instrument was introduced into the bladder without encountering any obstruction and with an



entire absence of pain. One hundred and twenty cubic centimeters of cloudy, residual urine were evacuated from the bladder. The mucosa showed marked generalized trabeculations and sacculations, two of which suggest the openings of diverticula. The ureteral orifices were normal in size, shape and position and both were visibly functioning. There were no evidences of new-growth or calculi. The internal sphincter was normal in contour, with no unusual angulations nor intrusions. On the anterior aspect of the internal sphincter, and along the floor and lateral sulci of the posterior urethra, down to the veru montanum, were numerous trabeculae, with one deep sacculation, also suggestive of a diverticulum. The veru montanum was atrophic and neither the ejaculatory nor prostatic ducts were visible. My impression was that this entire condition was due to faulty nerve supply as a result of an old spinal cord lesion.

Neurological examination revealed an old spina bifida involving the second, third and fourth sacral arches, with the nerve roots caught in the sac, and adherent to it.

Five days after admission the patient had a chill with temperature rising to 103.6°. He was given glucose retention enemas containing sodium bicarbonate and five days later his temperature returned to normal, although he complained of severe headache, and he occasionally vomited. On November 9, an indwelling catheter was introduced to relieve complete urinary retention and at this time the urea nitrogen rose to 141.4 mg. per 100 c.c. of blood, while the creatinine was 15.1. The patient then was vomiting almost continuously, not only his food, but also a large amount of bile-tinged fluid; and the carbon dioxide volume was 31.5 per cent. This acidosis, with the concomitant uremia, was combatted with large amounts of sodium bicarbonate and glucose solution introduced through the duodenal tube as well as by hypodermoclysis and proctoclysis. The condition gradually became worse with continuous vomiting and the patient was irrational. Intravenous infusions of glucose were administered daily, as well as retention enemas. The urea nitrogen, measured daily, ranged about 150, while the urine showed but a faint trace of albumin with many white and red blood cells. The temperature showed a septic curve, being as high as 105.6°F. Measures were taken to combat shock and at this period the patient seemed about to die. To the afore-

said therapy oxygen inhalations were added and finally the patient showed some response, so that on November 22, his temperature had dropped to normal, although the urea nitrogen was 148.9 and creatinine 9.

Three days later (November 25) the patient entered a similar episode lasting until December 6. The therapeutic measures heretofore utilized were repeated, resulting in a slow return to a rational condition. On December 21, cystoscopy was again performed for the purpose of estimating the separate renal function. No indigo carmine was excreted from either kidney at any time. A week later, separated phenolsulphonphthalein tests were made and there was no secretion during an entire day, from either kidney, while blood chemistry showed urea nitrogen 54.0 and creatinine 8.5.

On January 6, 1927, an ureteropyelogram was made on the left side, using 40 c.c. of 12 per cent sodium iodide solution. Five days later this procedure was repeated on the right side and enormously dilated ureters and kidneys were found. The urine obtained from each kidney at these cystoscopies revealed a large amount of protein with a few red and white blood cells from the left side, with no protein and an occasional white blood cell from the right. Cultures showed no growth after forty-eight hours.

The patient was now comfortable, had no pain and had stopped vomiting. The blood pressure which had been 120 to 130 systolic during the phase of acute acidosis was now 160 systolic. On January 15, the patient left the hospital apparently feeling well and has since continued under my care with no evidence of further disturbance except the development of a trophic ulcer on the posterior aspect of the left thigh, which now is almost entirely healed. I feel that the pathologic condition evidenced in the genito-urinary tract is unquestionably due to the lack of proper bladder function as a result of the alteration in the spinal cord and the lower peripheral nerves.

The table shows the entire blood picture in this patient, the deductions from which will be further elaborated by Dr. John A. Killian.

### Discussion

DR. J. A. KILLIAN: This type of case is both interesting and instructive from the chemical standpoint. There are two things of practical

## CHEMICAL CHANGES IN THE BLOOD OF E. S.

Date	Urea Nitrogen	Uric Acid	Creatinine	Sugar, mg. per 100 c.c.	Chlorides, mg. per 100 c.c.	Calcium, mg. per 100 c.c.	Phosphorus, mg. per 100 c.c.	Cholesterol, mg. per 100 c.c.	CO <sub>2</sub> Combining power vol. per cent
Oct. 26, 1926.....	70.0	...	10.7	102	...	...	...	...	37.2
Oct. 28, 1926.....	...	...	...	106	...	9.8	12.5	...	39.0
Oct. 30, 1926.....	73.3	...	...	140	...	...	...	...	36.6
Nov. 3, 1926.....	...	...	...	116	...	...	...	...	33.4
Nov. 5, 1926.....	66.0	...	...	122	...	...	...	...	39.0
Nov. 9, 1926.....	141.4	...	15.1	90	...	...	...	...	31.5
Nov. 12, 1926.....	70.6	4.4	13.1	94	340	9.2	21.8	...	31.5
Nov. 16, 1926.....	154.8	...	...	...	...	...	...	...	49.4
Nov. 18, 1926.....	150.0	...	9.6	156	...	11.0	7.1	...	...
Nov. 19, 1926.....	...	...	...	...	...	...	...	...	48.5
Nov. 24, 1926.....	148.0	...	9.0	87	486	...	...	...	60.7
Nov. 26, 1926.....	112.6	...	11.5	...	...	...	...	...	62.6
Nov. 29, 1926.....	109.3	...	11.3	...	...	...	...	...	39.0
Dec. 3, 1926.....	74.0	...	...	...	...	8.0	11.7	...	...
Dec. 10, 1926.....	60.5	...	5.6	...	...	...	...	...	54.1
Dec. 17, 1926.....	51.3	...	4.5	86	526	...	...	206	48.5
Dec. 28, 1926.....	54.0	...	8.5	...	526	...	...	...	39.0
Jan. 4, 1927.....	52.5	9.4	...	...	...	...	...	...	40.9
Jan. 11, 1927.....	47.5	4.7	...	92	544	...	...	...	40.9
Jan. 20, 1927.....	115.2	8.9	8.1	...	501	10.6	6.4	184	35.3
Feb. 3, 1927.....	72.5	7.4	8.6	77	503	...	...	...	...

Jan. 20, 1927 Hemoglobin = 12.5 per cent  
Total serum protein = 6.92 per cent  
Globulin = 1.78 per cent

Fibrin = 0.780 per cent  
Albumin = 5.14 per cent

importance that I would like to point out on the slide. First of all, if we consider the concentration urea and creatinine, the fact is impressed upon us that the urea and creatinine are increased to about the same concentration in all specimens. If the urea is ten times the normal, the creatinine is about the same. These findings are typical of cases in which the accumulation of nitrogenous waste products is due to mechanical obstruction, as Foster has shown experimentally in dogs.

The fact that creatinine rose to 15 mg. is not necessarily indicative of a poor prognosis. In a similar case, we have seen creatinine rise as high as 23 mg. per 100 c.c., with a good recovery. However, this man's creatinine does not return to the normal degree, the lowest figure being 4.5 mg. His kidney function never approaches the normal.

Another fact of practical importance is the value of the CO<sub>2</sub> combining power of the blood, following a tendency to acidosis and following impairment of the renal function. Note that the

CO<sub>2</sub> combining power is never very low, and that is due to the fact that he was always receiving alkaline therapy. However, the inorganic phosphorus of the blood continued to rise. The acidosis in the nephritis is due to failure to remove the acid phosphates from the body. Although we can bring up the CO<sub>2</sub> combining power, we cannot decrease the inorganic phosphorus by this means. If we follow the nephritic tendency to acidosis we must include in the blood analysis determinations of the inorganic phosphorus and calcium. This inorganic phosphorus rose to 21 mg., which shows a tendency to an acidosis in spite of the increase in the CO<sub>2</sub> combining power. The thing to be concerned about in the acidosis of nephritis is the decrease in the calcium; that is always indicative of a poor prognosis; and in this individual the therapy was so regulated that although we brought up the CO<sub>2</sub> combining power of the blood to a fairly normal figure, this increase did not result in a drop in the calcium.

## POLYCYSTIC KIDNEYS (BILATERAL) WITH BILATERAL HYDRONEPHROSIS

CLARENCE G. BANDLER, M.D., F.A.C.S.

This case reveals a urinary condition similar to the preceding, due, however, to an entirely different disease process. The patient, Mrs. M. C., aged thirty-four years, was seen by me on December 1, 1926, in consultation with Dr. Carlucci. She was in bed, acutely sick, with temperature 103.6°F., and unable to urinate. Two large, easily palpable abdominal masses comparable to the kidneys were noted. I had her transferred by ambulance to the Post-Graduate Hospital, where her history was as follows:

**Chief Complaint:** (1) Severe pains in back since birth of last child, thirty-six days before. (2) Inability to void urine. (3) Voiding of thick and bloody urine during the past month, which was probably due to contamination by the discharged lochia. (4) Passage of bloody, fleshy masses from the vagina for the previous thirty-six days.

**Previous History:** No illnesses, accidents nor operations since childhood. She has had no miscarriages and has five children alive and well. All confinements were with the assistance of a midwife only, despite the fact that the patient is the sister of a physician.

**Present Illness:** Immediately following the birth of the last child, she began to feel bad and had been in bed ever since, suffering from fever, general malaise, bloody discharge from vagina and questionable hematuria.

**Physical Examination:** Head, neck, heart and lungs essentially negative. Abdomen showed generalized tenderness with muscular rigidity and apparently there were large masses with nodulated surfaces in each flank extending forward to the median line on the right side and almost to the same point on the left. Tenderness over both kidneys. Vaginal examination revealed a profuse bloody discharge with an irregularly lacerated cervix which was freely movable. No masses nor induration palpable in the cellular tissue. The uterine corpus was enlarged, but not especially tender. A diagnosis of subinvolution was made. Rectal examination: Severe anal spasms with mucopurulent discharge and dilatation of hemorrhoidal veins.

**Course of the Disease:** The patient's tempera-

ture fluctuated between 101°F. and 104.8°F. with intermittent vomiting, and she was immediately given daily high colonic irrigations, catheterization and vesical lavage. Fluids were forced to 3000 c.c. daily, by mouth, intravenously and by hypodermoclysis.

On the day after admission, cystoscopy was performed, which revealed no cystitis, ureteral orifices normal in size, shape and position, and both were visibly functioning. No. 8 F. catheters were introduced 30 cm. up each ureter without encountering any obstruction. Numerous specimens of absolutely clear urine were obtained from each kidney at a very rapid and continuous rate of flow. During this examination 10 ounces of urine were collected from the right side and 9 ounces from the left. The patient was returned to bed with catheters indwelling in each ureter for the purpose of further drainage and a phenolsulphonphthalein test was performed. In two hours 230 c.c. of urine were obtained from the left side with but a trace of phenolsulphonphthalein and 250 c.c. from the right with no evidence of phenolsulphonphthalein. The urine from the left side showed numerous red blood cells and 10 to 15 white blood cells, per high power field. No microorganisms were found and the culture showed no growth in forty-eight hours. The urine from the right kidney showed 20 to 30 red blood cells and 30 to 40 white blood cells per high power field. No microorganisms were found and culture showed no growth in forty-eight hours.

Under forced fluids and colonic irrigations, the patient markedly improved and two weeks later (December 16), an ureteropyelogram was made on the right side using 55 c.c. of 12 per cent sodium iodide solution, but much more could have been introduced. There was no discomfort during this procedure. Forty-eight hours later an ureteropyelogram was made on the left side using 60 c.c. of 12 per cent sodium iodide solution and again more could have been introduced as there was no discomfort. At each of these cystoscopies the findings were identical with the examination of two weeks previously, and as before, there was a continuous flow of clear urine from each side. The x-ray diagnosis was bilateral hydronephrosis with hydroureters.

The blood count showed no leucocytosis or anemia.

Following the cystoscopy the tumor mass on the right side of the abdomen decreased about

one-third in size, while the mass on the left side also decreased, but not to the same extent. Palpation at all times revealed an irregularly nodulated surface over the anterior aspect of both kidneys.

BLOOD CHEMISTRY

Date	Urea N mg. per 100 c.c.	Creati- nine	CO <sub>2</sub> per cent	Sugar
December 2, 1926...	61	11.1	40.9	0.123
December 9, 1926...	51.1	4.7	54.1	
December 23, 1926...	21.2	3.0	53.2	

Diagnosis: polycystic kidneys (bilateral) with bilateral hydronephrosis and hydroureters.

The patient left the hospital on December 24, 1926, in poor condition, but several weeks later at home, her general condition was fair and she was able to perform a moderate amount of housework.

(No discussion)

### PROBABLY CONGENITAL BILATERAL URETERAL AND RENAL DILATATION

STANLEY R. WOODRUFF, M.D.

E. S., aged sixty-four years, male, white, a butcher, complained of frequency and nocturia since about twelve years of age. At twenty-five he was treated by a well-known urologist for what he termed tuberculous orchitis. At this time there was swelling and abscess formation of both sides of the scrotum which were incised and drained. Fistulae resulted from these, and discharged for several years before final healing took place. About this time there was considerable frequency and dysuria, with some hematuria. He remained fairly well up to about two years ago, when he noticed decided diminution in the stream, added frequency and nocturia, and greater cloudiness in the urine. His chief complaint was chronic retention. Four weeks previously the patient was entirely unable to urinate, and catheterization became necessary. He claimed that after two weeks of this he began to pass urine by rectum.

He was a fairly well-nourished man past middle life, well able to walk, and in full possession of all senses. There was moderate distention of the lower abdomen, evidently caused by an overdistended bladder. All

reflexes were normal, and the blood and spinal fluids were Wassermann-negative. Heart and lungs, negative. The blood chemistry showed urea nitrogen 20, creatinine 1.55.

The urine by catheter was of intensely foul odor, with a specific gravity of 1021, and contained albumin and a large amount of pus; no sugar. Roentgen examination was negative for stone. Rectal touch disclosed a mass well back in the rectum that was irregular and somewhat indurated without other delineation. There was no prostatic intrusion. Cystoscopy discovered an immense amount of residual urine. The bladder was grossly trabeculated, had a large capacity, and at the normal position of the ureteral openings were large, regular apertures that simulated diverticula. The posterior urethra contained one large, irregular linear opening that admitted a 5 cm. catheter, but no definite connection with the rectum could be established. There was no prostatic intrusion into either the posterior urethra or the bladder. Catheters passed into both openings that were previously described as being in the normal position of the ureters, and easily advanced 24 cm. on both sides. The cystoscope was withdrawn, a catheter inserted into the bladder, 250 c.c. of 10 per cent sodium iodide solution injected, and exposures made. Roentgenograms showed immense dilatation and loss of secreting tissue equally of both kidneys, dilatation and tortuosity of both ureters, with the bladder not entirely filled.

Under urinary antiseptic treatment and extensive lavage of the entire urinary tract, this patient improved very much, and left the hospital in fairly good condition. He became able to void again fairly well for ten months, when another sudden attack of acute retention brought him back to the hospital, at which time the blood chemistry showed urea nitrogen 55.5, creatinine, 1. A retention catheter was then inserted, and after two weeks' drainage, urea nitrogen was 93.75, the creatinine, 3.5. At about this point the patient developed a severe general toxic erythemia, and died in two days.

The interesting points of this case are the length of time that this man had evidently lived with little or no kidney secreting tissue, the simulation of prostatic disease, and the question as to whether his condition was of congenital origin, or a dilatation due to long-standing inflammation and absorption of the various coats of the bladder, ureter and renal pelvis.

(No discussion)

# TRANSACTIONS OF THE SECTION OF ORTHOPEDIC SURGERY NEW YORK ACADEMY OF MEDICINE

*Meeting of February 18, 1927*

THE CHAIRMAN DR. HARRY FINKELSTEIN, PRESIDING

[There were no discussions at this meeting]

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## RECONSTRUCTION PROBLEMS *of the* PARALYZED UPPER EXTREMITY

PRINCIPLES OF EDUCATION; IMMEDIATE  
AND END-RESULTS OF OPERATION\*

A. STEINDLER, M.D., F.A.C.S.

IOWA CITY, IOWA

LOOKING back upon the reconstruction work of the upper extremity, which was begun ten years ago with a good deal of hesitancy and apprehension, I find much that has stood the test of time and has given me hope and encouragement; but also, on the other hand, much that invites criticism and gives cause for further investigation. Quite naturally it is the latter kind of experiences that is of the greatest interest.

From the beginning of the work, in order to find orientation in a rather poorly explored field, we tried to analyze the whole complex mechanism of the upper extremity into its simpler components, setting these up, as it were, as concrete and definite aims for reconstruction. So we came to evaluate the disabilities, point for point: failure of abduction of the shoulder; or of flexion of the elbow; or of pronatory and supinatory power of extension of the wrist; of the ability to close the fingers; and finally that of opposing the thumb. These were the elementary recon-

structive aims and, to meet these, treatment in general and operative procedures in particular were fashioned. I believe that this plan of procedure in its almost naïve simplicity has served us well as a starting point and, on the whole, it still stands as the guiding principle in planning the work of reconstruction. Subsequent experiences, however, taught us that the rules required qualifications. These qualifications rose from several sources. Two of them are of particular interest:

The first is of muscle dynamic nature. It concerns the counter-effect of muscle contraction upon the central point of application. In our mechanical calculations we too often take it for granted that the effect of muscle contraction at the peripheral point of application is entirely dynamic, and at the central point entirely static or stabilizing. We found, however, in several instances that the effect of the central action occasionally became quite evident, leading to dynamic changes and to disalignment. This instigated a much

\* Also read before the Boston Orthopedic Club, February 14, 1927.

closer study of muscle dynamics from the point of central and remote reactions upon the skeleton, a point of view which, of course, should be the only permissible one in the study of the kinetics of the upper extremity but which had not been fully appreciated until untoward effects of muscular counteraction were observed.

For instance, in abduction of the shoulder: In the general plan the main principle of bringing about abduction by movement of shoulder blade and humerus as a whole is satisfied by the operative plan, but it did not cover the case of counteraction of the shoulder girdle musculature upon the spine; consequently cases of disalignment were observed that might have been anticipated.

Another point of embarrassment often arose out of the field of the so-called substitutionary or secondary movements. For instance, the ability to produce pronation and supination by rotation in the shoulder joint; of extension of the elbow by forward flexion in the scapulohumeral articulation, etc.

We now realize how important it is to study the possibilities of substitutionary movement. In the first place, without knowledge of the natural routes of substitution an operative plan can hardly be formulated without frequently turning out to be a piece of meddlesome surgery. Furthermore, muscle training and muscle drill must be based on facts of substitutionary movement to a large extent. The teacher must be conversant with the usual tricks the patient uses to cover up his deficiency.

A third difficulty arose from the failure to recognize and appreciate secondary muscle action. For instance, in the substitution of the missing flexion action of the elbow we are handicapped by secondary pronatory action of the transplanted flexor muscles. Special provision also must be made to avoid this undesirable complication.

I hardly need to say that the dynamics of muscle action are not as simple as the

textbooks of anatomy would lead us to believe. Never better than in the upper extremity do we realize that muscle function is not a constant, and that the action of one muscle or, rather, the actions of one muscle, must be described in terms of function dependent upon the particular position of the joint at the time of action. To describe a muscle by the direction of its pull in one or even more planes of the body gives a very incomplete picture of its function unless the relative ratio between the different movements in the different planes is also given, as well as the position of the joint in which this motion or these motions may occur in their respective relations of strength and excursion.

For these reasons, I am doubly thankful for the opportunity to present this subject again and I hope to be able now to add to the discussion of former years some influx of critical analysis along such lines as I have just indicated. Many failures we have been able to explain upon the disregard or oversight of physiological or dynamic principles. As we advance in the work, we hope to receive further light on the cause and nature of our shortcomings, from the fundamental sciences upon which this work must stand.

#### PROBLEM I. THE FLAIL SHOULDER

The principal indication is the paralysis of the deltoid muscle. It is stated that abduction of the arm into a field in which the extremity may sweep over the spherical quadrant that lies in front of and lateral to the shoulder joint is an essential for the practical use of the extremity. If the deltoid muscle is permanently paralyzed (and the burden of proof here rests with the observation and the treatment of the first year or two after the paralysis), then the indication is arthrodesis of the shoulder joint since we know, at this time, of no other satisfactory method of transference of muscle power from the shoulder girdle to the humerus. Even though ample muscle material might

be at hand, the anatomical conditions are unfavorable for the muscle transplantation; the essential mechanical conditions cannot be met. In the arthrodesed shoulder it is the trapezius and serratus muscles in combination, that, by rotatory action upon the shoulder blade in the sternoclavicular junction, bring about the elevation of the arm. As we study the muscle dynamics of the shoulder girdle we find that the muscles are paired in their action in a peculiar way. The upper portion of the trapezius and the pectoralis minor both acting in the same directions, swing the shoulder blade obliquely from above and behind to forward and downward, the oblique back and forward swing. Then the middle trapezius, with the serratus magnus, brings the shoulder blade back and forward, also acting in the sternoclavicular joint, the horizontal back and forward sweep. Then the rhomboids and the lower serratus muscle swing the shoulder blade from above and backward to downward and forward, also an oblique sweep, but this time more in the acromioclavicular junction. Finally, a fourth pair is represented by the levator scapulae and the lower trapezius pulling the shoulder blade upward and downward along the vertebral border, the action taking place mostly in the sternoclavicular junction, a perpendicular sweep. All these motions are independent of the rotatory motion of the scapula which again can be modified in its direction by any of the aforementioned pairs of muscles, as they favor sweeping motion in a particular direction. It must be calculated which of these would be the most useful for the arm in the given case.

If paralysis of the deltoid exists, this does not necessarily settle the indication. The question arises: Is a substitutionary motion for the loss of the deltoid muscle possible? In the stricter sense of the word it is. By simultaneous contraction of the biceps and triceps muscles such stabilization of the humerus against the glenoid fossa can be obtained that humerus and

scapula almost move as a unit, so that the contracting trapezius accomplishes abduction of the arm. For the unilateral cases this is hardly a satisfactory solution. But for bilateral cases, in which there are certain objections to the fusion of both shoulder joints, one will do well to consider the possibility of substitutionary motions on these grounds.

In my series are 65 operations for arthrodesis of the shoulder. Of these a large majority, probably about 80 per cent, have shown what can be considered good end-results, the time of observation extending over ten years. This statement does not, however, exactly cover the situation. We find cases in which the elevation of the arm by means of the trapezius muscle is  $90^\circ$  and over, and we find others in which it barely reaches  $45^\circ$  or  $50^\circ$ . In general, those cases in which osseous fusion was obtained gave better results but, on the other hand, fibrous union does not always vitiate the operative result. Above all, we find that the type of fusion was not always in accordance with the ultimate dynamic effect obtained. As we examine the cases more closely we come to recognize that each case has a certain optimum of position in which fusion will yield the best possible advantage. This does not mean that one must vary position with each individual case but, according to the conditions of the muscles of the shoulder girdle, the cases may be grouped and the desirable position for the fusion may then be determined.

In the shoulder paralysis following anterior poliomyelitis we have the following situations:

1. The deltoid is paralyzed but all other muscles are preserved.
2. The deltoid is paralyzed and, in addition, the serratus magnus.
3. The deltoid is paralyzed and, in addition, the rhomboids and levator scapulae.

Each of these problems demands slightly different arrangement according to their mechanical constellations.

1. *The Deltoid Alone Is Paralyzed.* The



question is to establish the optimum position in which the shoulder joint is to be fused. Let us consider the purely frontal abduction of the arm. We find that in this position a strong demand is made upon the contraction of the middle fibers of the trapezius, coming from the spine of the scapula, and also of the rhomboids. Cooperative with the trapezius action is that of the lower serratus fibers which support the upper portion of the trapezius in the rotation of the shoulder blade. The middle fibers and the rhomboids are engaged in stabilizing the upper, inner angle of the scapula. When, by action of the serratus muscles, the lower angle of the scapula clears the side of the thorax further action of the serratus is hereby mechanically impeded; while the upper portion of the vertebral border remains close to the spine the lower angle of the vertebral border leaves the thorax. We see, therefore, that in abduction of the arm in the frontal plane the serratus loses in effect and influence the more the lower angle of the scapula protrudes. To this we must add the fact that this angle slips out from the upper edge of the latissimus dorsi which further embarrasses the power of the serratus.

A further limitation arises from the tension of the coracoclavicular ligament. Thus, if we wish to abduct the arm farther, it becomes necessary to incline the trunk to the other side.

In contrast to this let us examine the situation when the arm is elevated in anterofrontal or diagonal plane. Here elevation of the arm is accomplished to a much higher degree than in a purely frontal plane. The scapula is brought more in sagittal direction by the action of the pectoralis minor. The coracoclavicular ligament becomes taut much later, and the impingement of the coracoid process on the lower edge of the clavicle is evaded by torsion in the sternoclavicular joint. The lower angle of the scapula stays close to the thoracic wall. The rhomboids are relaxed and offer no obstacle to the torsion

of the shoulder blade. The upper trapezius and levator anguli scapulae and also the lower portion of the serratus can now contract to best advantage, giving the scapula the highest possible degree of rotation.

It follows, therefore, that from the muscle-mechanics point of view, in fusion of the shoulder joint for deltoid paralysis when both trapezius and serratus magnus are acting, the optimum position is that of abduction and forward flexion which will give the arm a sweep in an antero-diagonal plane.

2. *The Serratus Magnus Is Paralyzed in Addition to the Deltoid.* Owing to the lack of serratus action the scapula is pulled upward and backward by the uppermost fibers of the trapezius muscle; this becomes more marked as the arm is weighted down, and, when the arm is carried forward the scapula becomes winged. The strongest contraction of the trapezius is not able to bring the lower angle of the scapula beyond the posterior axillary line. On the other hand, we find that the serratus paralysis is least noticeable when the arm is brought in abduction in the purely frontal plane, since in this position the serratus muscle is called upon to act only partially. In this position, also, the marginal portion of the trapezius muscle effects a rotation of the scapula of sufficient degree, although it does not attain the range of normal conditions. This leads us to the conclusion that in the presence of a serratus paralysis arthrodesis of the shoulder for loss of deltoid should be carried out more in the frontal plane (Fig. 1.)

3. *Rhomboids and Levator Are Paralyzed in Addition to the Deltoid.* The upper portion of the trapezius substitutes for the lost tension of the rhomboid and levator muscles. If the shoulder is lowered and the lower angle of the scapula moves outward, the loss of the opposing rhomboid action deprives the serratus magnus of a fixed point of application, thereby secondarily and potentially weakening its power. Fusion under this condition is best carried out in a position midway between the

anterolateral plane, which applies to the first situation, and the purely frontal plane which applies to the second situation, that is, in a position of slightly forward diagonal plane. (Fig. 1.)

At what angle should fusion be obtained? In general, in children at 90 degrees, in adults at 60 degrees to 70 degrees, but this would apply to situation 1 only.

In paralysis of the rhomboid, rotation of the scapula is considerably impaired and in these situations the fusing angle should be 90 degrees or slightly above.

We have not considered the situation which not infrequently arises in *paralysis of the pectorales muscles*. In this situation a strong point should be made of bringing the arm in sufficient degree of forward flexion, since the pectorales, the principal force in this direction, are lacking, and only the serratus and anterior fibers of the trapezius are left to bring the shoulder blade forward.

#### PROBLEM II. THE FLAIL ELBOW

Biceps and tibialis anticus as well as brachioradialis muscle are paralysed. The operation most adapted to this situation is the muscle transposition of flexor plasty of the elbow. Thirty cases were operated on.

The analysis of elbow flexion teaches that biceps and brachialis anticus are the two principal flexors. The biceps works better with the elbow extended and the humerus extended dorsally because then both of its heads are under tension. The situation is less favorable when the humerus is carried forward.

The brachialis anticus is independent of forward and backward movement of the humerus.

The brachioradialis is third in line of the flexors of the elbow; it is also a stabilizer of the forearm in regard to pronation and supination, insofar as it maintains the forearm in a mid-position. When these three muscles are paralyzed there is no efficient flexor of the elbow left except the extensor carpi radialis longior;

but its flexion effect is small and does not start until after the first 20 degrees of flexion. The other muscles having their origin in front of the elbow axis are the flexors arising from the internal condyle. Their line of pull is so close to the transverse axis of the elbow that their flexing component becomes exceedingly small.

The principal point of the operation used for this condition is to release the common heads of the flexors of the forearm from their attachment to the



FIG. 1. Position of the arm for arthrodesis of the shoulder. A. Paralysis of the deltoid and serratus. B. Paralysis of deltoid. C. Paralysis of deltoid and rhomboids.

internal condyle and to transpose them higher up on the humerus so that they may develop a greater momentum for elbow flexion as the distance of their point of insertion from the transverse axis of the elbow is increased.

But, in this same group of muscles, the pronator radii teres, the flexor carpi radialis, palmaris longus, and flexor carpi ulnaris, all, with the exception of the latter muscle, are pronators as well as flexors of the elbow; and, by central displacement to the higher point at the humerus, they increase not only their flexion power at the elbow, but their pronatory component as well. If the extensors of the wrist and fingers are strong they may sufficiently neutralize this increased pronatory tendency by their own supinatory element. If not, however, one will find the strongly increased pronation an objectionable feature which may

considerably jeopardize the end-result. One must then either lengthen the tendon of insertion of these muscles in order to weaken their pronatory capacity, or else the peripheral tendons of the muscles may be transposed from their point of insertion backward across the forearm to act as supinators. To this end the pronator radii teres may be severed at its point of insertion and united with the muscle belly of the flexor carpi ulnaris; both are led around the ulna to the dorsal side of the forearm and fastened to the outer side of the radius close to its distal end, and are thereby transformed into supinators while they retain their proximal effect as flexors of the elbow. This simply goes to show that in rearranging muscles both insertion and origin must be analyzed and entered into the calculation of their mechanical efficiency. Such a situation may often arise in spastic paralysis where we frequently see pronation contracture. Holding the forearm in mid-position between pronation and supination is of considerable dynamic import.

Supinatory and pronatory movement can be substituted by rotations in the shoulder joint. If the shoulder joint is fused, as is the case in many instances in which a combined operation of fusion of the shoulder and plasty of the elbow is performed it then devolves upon the rotators of the scapula to produce inward and outward rotation by movement of the scapula in the sternoclavicular articulation. This again is the function of the rhomboid, trapezius, and serratus; and here is another instance of the intimate relation between elbow and shoulder girdle movement.

#### PROBLEM III. PRONATION CONTRACTURE

Most of the cases were of the spastic paralytic type. There were 42 operations. The types of operation were resection of the pronator teres and quadratus, tendon transplantation of pronator radii and flexor ulnaris to the dorsum of the forearm.

Finding frequently the older procedures of resection of the pronator and also that of transplantation according to Tubby insufficient, a later procedure of tendon transplantation was devised which provides for better mechanical and dynamic conditions.

With the elbow extended the total supinatory power is greatly in excess of that of pronation; with the elbow flexed it is merely equal to the total pronatory power. The principal supinators are biceps and supinator brevis, not considering the brachioradialis which is only a conditional supinator, that is, from an extreme pronation position. Extensors of thumb, wrist, and finger are secondary supinators of comparatively small power. Under ordinary conditions the tone of the pronator radii teres alone is sufficient to counteract the supinatory action of the biceps and supinator brevis. This can be seen from the fact that in certain fractures of the radius above the insertion of the pronator the upper end of the fragment is carried into full supination by the action of the biceps and supinator brevis, but when the fracture of the radius occurs below the insertion of the pronator teres a mid-position of forearm is maintained. We understand now why spastics, in order to effect supination, will extend the elbow, for thereby they facilitate outward rotation of the humerus and also give the supinators a position of preponderance over the pronators. By using the combined radii teres and the much stronger flexor carpi ulnaris and leading both muscles over the outside of the ulna to the back of the forearm and then diagonally to the outer side of the radius, we obtain a much better leverage and consequently much better supinatory power of the forearm.

Shall the pronator quadratus be sacrificed by myotomy or not? This depends entirely upon the degree of the pronation contracture. In most of the cases I found it advisable to leave the muscle intact as it is necessary to maintain the muscular balance between pronator and supinator group.

Restoration of pronatory and supinatory balance is one of the most difficult tasks in spastic cases. It requires not only primarily a good dynamic and mechanical muscle arrangement but also a great deal of painstaking and persistent muscle education.

In the interest of the muscle dynamics of the finger one frequently is not at liberty to stabilize the wrist in suitable position but must allow it to follow its own inclination to go into flexion. Such a situation naturally makes the question of pronatory and supinatory balance, so important for the use of the hand, still more complicated.

## PROBLEM IV. STATICS AND DYNAMICS OF THE WRIST JOINT

In cases of paralysis of the muscles of the wrist joint I have on previous occasions pointed out that there are two ways of restoring balance and power. One is the transference of power by tendon transplantation, the other is the stabilization of the wrist by arthrodesis. In a large group of cases a combination of arthrodesis and tendon transplantation is indicated. As far as the wrist is concerned its stability is a necessity, and mobility of the wrist without stability represents a very doubtful advantage.

In musculospiral paralysis of wrist and fingers, tendon transplantation may procure both stability of the wrist and mobility of the fingers.

In infantile paralysis, where the stricken field is usually much larger, the mobility of the wrist must often be sacrificed in favor of complete and reliable stability. The elimination of wrist motion also opens the possibility of making use of flexors and extensors of the wrist, now becoming available for transplantation to the paralyzed extensors or flexors, respectively, of the fingers. These are, however, only general principles. Operative plans are so susceptible to changes according to the individual merits of the case that it appears necessary to go deeper into a mechanical analysis of the situation, which

ultimately could determine the details of what operative procedure, if any, is suitable for the individual situation. Starting from the so-called position of rest which the wrist assumes when no muscle is especially innervated, a position given by the equation in which the momentum of all flexors at rest equals that of all extensors at rest, we find that this position does not represent the position of the wrist in which stabilization is to be desired. It is not the one in which the dynamic conditions are at

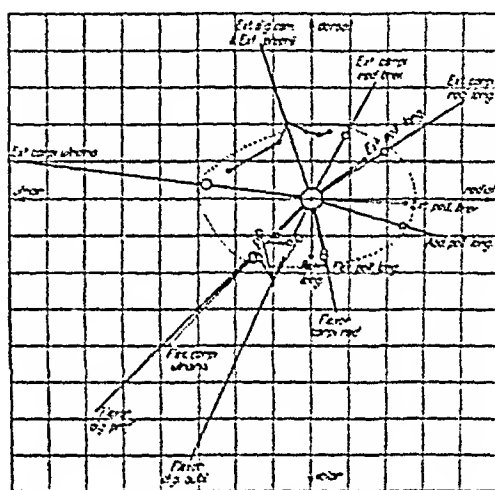


FIG. 2. Diagram showing dynamic relations of flexors and extensors of wrist and fingers.

their optimum; it is not the position the hand automatically assumes when attacking a strenuous task. With wrist flexors and extensors innervated, however, we find that the dynamics equilibrium between the weaker flexors and comparatively stronger extensors of the wrist joint is established only when the wrist goes in position of slight hyperextension. This we may call the position of action; in this position the momentum of extensor and flexor groups is equal in the state of innervation and this position is the basis of all display of power in the fingers.

If we further study the diagram of the muscles moving the wrist we notice that the balancing of the muscle groups against each other does not occur in the direction of flexion and extension only; there is also a balance of muscle power in regard to ulnar and radial abduction and, what is

isms. At times this fusion involves any of the other organs, especially the gall bladder, and then the anatomical defect becomes more evident and the pathology more easily understood. In this paper I cannot discuss all the pathological alterations that may follow the conditions described above. I will only emphasize the fact that these adhesions are not due to infective processes, that they develop in utero and that the common changes observed later in life are due to the

CASE 1. F. B., male, aged thirty-four years, referred by Dr. Gade.

Roentgen report by Dr. W. M. Priest on films of this case: "1. Stomach of normal size and contour. 2. The cap is irregularly deformed by spasm and adhesions, which I believe arise from chronic gall-bladder disease. 3. The appendix is long, segmented, tender, and adherent to the terminal ileum, close to the ileocecal valve. Therefore, I believe it to be pathological. 4. At the point of the hepatic flexure, there appears to be a decided tendency for this part of the gut to be displaced posteriorly. 5. There is marked spasticity throughout the entire colon. 6. There is redundancy of the sigmoid. 7. There is no evidence of calculus in the kidney, ureter, nor bladder."

The series of films in this and other cases show how constant is the acute angle formed by the right portion of the transverse colon at about 3 cm. to the right of the spine. At operation it was found that the mesocolon and the lesser omentum were fused together, and the appendix was slightly kinked but otherwise normal. The patient had a subicteric color and was suffering from vague digestive troubles and constipation, and had had two attacks of severe abdominal pain, diagnosed as appendicitis. Subicteric color, constipation and digestive symptoms disappeared after operation.

CASE 11. P. M. R., aged nineteen years, one pregnancy. Referred by Dr. Matera.

Roentgen report by Dr. W. M. Priest on this case: "1. There are no constant defects in the stomach or the first portion of the duodenum that would indicate an abnormality. 2. The cap and the second portion of the duodenum are firmly fixed to the right. This, I believe, is the result of adhesions from a pathological gall bladder. 3. There is very marked hypermotility with spasticity throughout the entire intestinal tract. At the end of the fourth hour the head of the meal had reached the rectum. 4. There are adhesions involving the lower part of the cecum which are the result of a pathological appendix, which is visualized, kinked, segmented, and tender on deep pressure. 5. Some fixation of the hepatic flexure. 6. The stereoscopic films of the colon after the



FIG. 5. Case 1. Roentgenogram, three and one-half hours after barium meal.

conditions I have described. It is clinically important that these conditions can be diagnosed and properly treated in adult life. I have been able to make the correct diagnosis in over 50 cases, some previously operated on by very competent surgeons for chronic appendicitis, cholecystitis, etc., without benefit. The typical roentgen-ray picture of the cases is an angulation of the transverse colon more or less close to the spine, as here illustrated. To avoid repetition and save space I show only a few illustrations and cases which are typical.

fingers and forearm. The muscles being shortened to their limit it is obvious that no further contraction can be displayed and the fingers remain in whatever position of flexion they have assumed. The muscle has accommodated itself to the length to which it has been placed. The usual expedient of lengthening these muscle units by lengthening the tendon might be useful where structural shortening of the muscle itself is only slight and where the muscle can still further accommodate itself to the change in its dynamic condition. In the ischemic contracture of Volkmann or in severe cases of spastic flexion-contractions of the wrist where a maximum contraction of the muscle bellies or a maximum shrinkage exists, lengthening of the tendon of these muscles cannot relieve the condition because it changes nothing in the condition of the muscle belly. It is quite obvious that in all these conditions conservative treatment by splints and manipulation must have the precedence because it actually lengthens the affected muscle. According to our best observers the length of the muscle at complete rest is double that in complete contraction. The principle of passive stretching of the muscle is exactly the one which Jones applies in the treatment of ischemic contracture. Cutting or lengthening of the tendons of the finger flexors so weakens their action that the ultimate result of any sort of indiscriminate tendoplasties can produce nothing but a cosmetic effect. Therefore we should refrain from interferences with flexors of the fingers and of the thumb and stress the conservative treatment by splints and manipulation to the utmost. It is quite a different matter with the flexion of the wrist. If the frequent contracture of the carpi ulnaris in Volkmann's contracture or in spastic cases cannot be overcome by manipulation or splint treatment, I do not hesitate to lengthen these tendons because we gain by it that physiological hyperextension position of the wrist which is so necessary a basis upon which finger action must be developed. But neither in ischemic

contracture nor in spastic cases do I believe in the tenotomies or in the plastic lengthening of the finger flexors with the occasional exception of the long flexors of the thumb.

In spastic cases we have also learned to avail ourselves of what may be called the passive insufficiency of the extensor tendon. With the wrist in flexion the tendons are held in the state of tension which conveys to them a certain amount of power against the action of the finger flexors. The patient can avail himself of the elastic pull of these passively insufficient extensor tendons. When he wishes to release the closed fingers he carries the wrist in further flexion and the increased passive tension of the extensor tendons will separate the fingers. Because we think that this mechanism is extremely useful in spastic cases and one upon which the patient strongly relies for the play of his finger action we often refrain from stabilizing the wrist in hyperextension; and an indication for the latter operation should never be made until one is sure that the feature of passive insufficiency of the extensor tendon is not needed for the release of the finger grip.

#### PROBLEM VI. DISABILITIES OF THE THUMB

1. *Thenar Palsy*. Since the opponens is inserted in the radial side of the first metacarpal while the flexor brevis goes to the radial side of the metacarpophalangeal articulation, it follows that opponens action of the thumb is regularly combined with a somewhat pronatory longitudinal torsion of the metacarpal. The abductor participates especially at the beginning of the opposition movement without any particular rotatory effect upon the metacarpal. Opposition is initiated first by abductory and pronatory movement executed by the short flexor and opponens; then follows opposition movement, and the whole swing is finally finished by adductory movement carried out by the adductor and the ulnar head of the flexor brevis. All muscles, therefore, combine in the performing of the opposi-

tion movement of the thumb. Of especial importance are the radial head of the short flexor and the opponens pollicis.

Thenar palsy leaves a definite deficiency of the thumb which cannot well be substituted by any of the long muscles. When the median innervation is gone, two and one-half of the muscles of the thenar eminence are out of commission; such a deficiency cannot be made up by the remaining one and one-half muscles, that is, by the abductor and half of the short

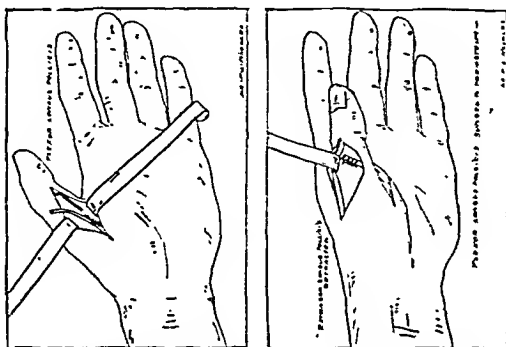


FIG. 5. Flexor plasty of thumb. Author's method.

flexor alone. In this situation I avail myself of a muscle plasty upon the long flexor of the thumb by which the radial half of this tendon is led around the base of the basal phalanx of the thumb and is here fastened to the periosteum (Fig. 5). It so forms a ligamentous check, the direction of which is very much in line with the pull of the opponens and the radial half of the short flexors. Nye uses the tendon of the abductor pollicis longus, leading it underneath the annular ligament and giving it a direction very similar to that of the opponens. I have applied both methods and found them very useful.

2. *Inability to Extend.* This is a very disturbing factor in spastic conditions. The thumb is slung under the fingers in an attempt to close them so that gripping or the picking up of objects is made impossible. We meet this situation by an operative procedure devised by Biesalski and Mayer; it is in principle a check operation performed upon the long extensors of the thumb; the tendon of the extensor of

the index finger is used for anchorage to the long extensor of the thumb after the latter is given the best possible tension. Flexion of the thumb now meets with an increased obstacle and is retarded sufficiently to allow the fingers to close before the thumb has a chance to be caught underneath them. While this method does not exactly procure a dynamic equilibrium it is a very effective check to the precocious flexion propensity of the spastic hand. Sometimes this check proves too strong and then hyperextension in the metacarpophalangeal joint develops. When this occurs a plastic operation upon the tendon and the capsule becomes necessary. Sometimes one has to resort even to resection of the metacarpal head.

#### AFTER-TREATMENT

1. *Splints.* We have learned to appreciate the fact that in the after-treatment of operative reconstruction work of the upper extremity generalization is impossible. We may use certain typical splints to overcome pronation contracture or others to correct flexion contractures of the wrist, or those of the elbow, or the adductor contractures of the shoulder joint, etc. But with the exception of very simple situations, such as fusion of the shoulder joint, there are few situations in which one splint alone is found sufficient; in most cases splints of various types had to be applied not in succession but in alternation. A great deal depends upon the judicious choice of splints and upon their proper construction and application. For instance, in ischemic contractures, the stretching of the fingers, the straightening of the wrist, the developing of the gripping power and the relief of pronation contracture, all have to be attempted at the same time and all require a different type of splint.

2. *Massage and Mechanical After-treatment.* Massage and active motion should, as a rule, wait no longer than operative wound healing requires. Massage greatly enhances active motion by increasing the

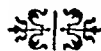


muscle tone. In addition, there ought to be recommended warm bath or whirl spray before and after active movement. It goes without saying that active exercises should be of the simplest kind and precision and speed should be acquired for one motion or movement before a more complicated one is undertaken.

In tendon transplantation of the flexors to the extensors consideration must be given to the difficulties that arise from the inversion, or change, of muscle function. They are not as great as might be anticipated. The transplanted flexors, for instance, are never inactive in extension under normal conditions, nor are the transplanted extensors inactive in flexion, so that the converse tasks which the muscles are made to perform are not, after all, entirely alien functions. There is a certain amount of volitional block, however, which is sometimes rather hard to overcome, and which requires a good deal of patience and perseverance.

3. *Muscle Reeducation.* Nothing particular is to be added to what already has been said in regard to systematic muscle reeducation. We base our system of muscle reeducation upon the use of standard objects and the employment of certain stereotype motions. The quality of the

work performed is gauged by relating these movements to the time it takes for their performance. We found that a certain number of cases in which muscle efficiency was routinely investigated before any further treatment was undertaken, showed a proficiency block at a certain point; when this block registered repeatedly in several readings and at different times, it could be assumed that a constant and definite physiological cause existed for it. Such a cause may lie in a particular type of disability, such as described previously, or it may be of some other nature, and arise from a situation which is still obscure and for which we consequently know of no surgical remedy. But in so far as these disabilities concerned situations known, such as those related in this paper, we have often been able to relieve the impediment, and procure further proficiency of the hand by operative methods. This was the case especially in the described disabilities of the thumb, of the forearm, etc. We feel, therefore, that the systematic testing and charting of functional ability upon the lines indicated not only gives us a conception of the progress made under treatment, but it also serves as a guide to indicate certain definite and very often surgically remediable disabilities.



# THE SUPRATROCHLEAR FORAMEN CLINICAL AND ANTHROPOLOGICAL CONSIDERATIONS

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IT is not without considerable hesitancy that I venture to present, before a gathering whose aims are as practical as this one, a study of a single anatomic variation in the morphology of the lower end of the humerus. I have been moved to do so, however, by several considerations:

First, it is an anatomic variation which in these days of abundant roentgenization is not infrequently seen, though rarely if at all noticed.

Second, its presence has some bearing on the functional capacity of the elbow joint.

Third, it must receive consideration and its significance must be appreciated when there is a history of trauma, particularly when a fracture of the lower end of the bone has resulted.

Fourth, it is of interest from the standpoint of man's philogenetic relationship. It is one of the many markings which permits the anthropologist to study the molding effect of the countless ages of struggle on the part of the man, to attain his present anatomic form.

In the evolution of man the condylar portion of the lower end of the humerus has undergone considerable modification. If the position of the elbow-axis is studied by measuring the condylo-diaphyseal angle, formed by a tangent to the trochlea and the axis of the diaphysis, a marked difference between the old and recent man will be found.

In the Neanderthal man, the trochlea is practically horizontal, while in modern man its axis is oblique.

With the change in the axis there have been structural changes in the trochlea, particularly in the development of the coronoid and the radial fossae.

CONDYLO-  
DIAPHYSEAL  
ANGLE

Swiss average.....	77°
Bajuvares.....	78.5°
Swabians and Alamans (Bavarian).....	80.2°
Alamans of Switzerland.....	80.5°
Terra del Fuego.....	83.0°
Senoi.....	83.7°
Paltacalo-Indians.....	84.5°
Homo Neandertalensis.....	87°

In the Senoi both fossae are practically alike, and the bony ridge that separates them runs directly downward in the axis of the diaphysis. In the modern Europeans the ridge deviates externally. Because of this, the coronoid fossa has come to lie practically in the center of the bone, just above the trochlea, while the radial fossa is lateral to the central axis of the diaphysis. The coronoid fossa is moderately deep while the radial fossa is very shallow.

During flexion of the forearm the coronoid fossa receives the coronoid process of the ulna. Posteriorly, there is the deep triangular depression, the olecranon fossa, in which the summit of the olecranon is received in extension of the forearm. These two fossae are separated from one another by a thin, more or less transparent lamina of bone, lined in the fresh state by the synovial membrane of the elbow joint.<sup>1</sup>

The plate of bone separating the coronoid and olecranon fossae may be perforated. This opening is called the supratrochlear foramen. It is a more or less oval or elliptical opening with a smooth margin

<sup>1</sup> The margins of the fossae afford attachment to the anterior and posterior ligaments of this articulation. Under cover of the transverse fibers of the posterior ligament, which forms a strong band bridging across the olecranon fossa, there is a pouch of synovial membrane lining the fossa and a large fat pad which projects into the upper part of it and is pressed into the fossa by the triceps.

and sloping edges with the long axis transverse, about 5 to 9 mm. wide and 3 to 4 mm. high. It is located above the epiphyseal line and is in the intra-articular part of the olecranon fossa below the line of reflection of the synovial membrane which crosses the middle of the fossa.

When large, the hole is actually in an open state, when small it may be covered by a membrane. When the bony septum is intact it contains several small perforations.

Most of the older anatomists, Braus, Renle, Seppay, Testus, mention this varia-

variations. But when specimens of several species of the same genus show it, its general occurrence in the species, if not in the genus, is a justified assumption. Among the marsupials it is found in the peremes; among the ungulates, in the wild pig, hyrax and others. Some of the beasts of prey, hyena, wolf, jackal and various insect eaters, have this characteristic.

As in man, so in the lower animals, the humerus is imperforate in the embryonal stage. The perforation is frequently found in semi-apes and apes.

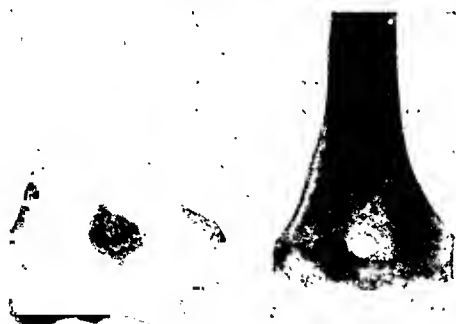


FIG. 1. Two left humeri, one with perforation and one with intact septum. Old Egyptian.

tion. Market calls the opening the supracondylar foramen.<sup>1</sup>

The supratrochlear foramen is not present at birth. In young individuals the bony septum is relatively thick. According to Hultkrantz, it may be 4.4 mm. thick in the newborn. The septum is gradually absorbed during childhood, producing the foramen which has not been observed before the sixth year.

The supratrochlear foramen is found only in mammals, both in the lower and in higher orders. It is absent in swimming and flying forms and in terrestrial forms adapted to life in the water. It is inconsistent in various species and its absence or presence cannot be taken as an index for the species since there may be individual

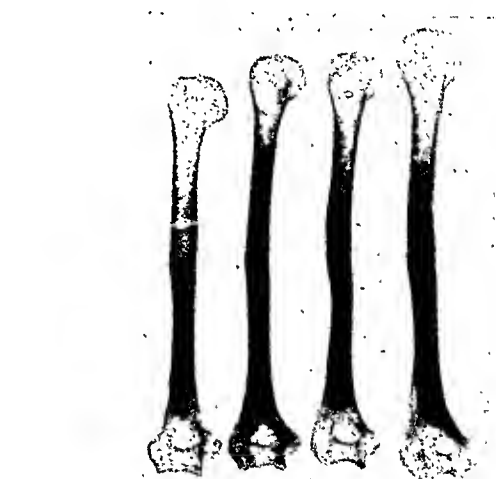


FIG. 2. Left humeri with well-marked supratrochlear foramen. Ancient Indians of Salt River Valley.

Darwin mentions this foramen in the human as being one of the characteristics that show his close relationship to the lower forms. He states that it occurs, but not constantly, in various anthropoid and other apes, in full-grown gorilla, orang and chimpanzee. In the gibbon no supratrochlear foramen is present in infancy.

Anthropologists have studied the frequency of this foramen in various groups of people. The percentage of its occurrence varies greatly. Martin claims that this characteristic is relatively rare in late Europeans, but is commonly present in the neolithic and the prehistoric types, and the statistical data which he has tabulated seem to indicate the greater frequency of the foramen in ancient primitive people. It has been found in the humeri of skeletons from the caverns of

<sup>1</sup> This name is now reserved for a foramen formed above the median epicondyle, by a complete osseous or fibrous bridging of the supracondylar process to the median epicondyle. This foramen is present in many mammals and reptiles. The supracondylar process may be associated with the supratrochlear foramen as in Figure 6. This supracondylar process is fairly common in man though the foramen is rarely found.

Montmaigre, the sepulchre of Chelles and the excavations of Chamont wherein were the men of the Stone Age. The highest frequencies appear to be in the Veddas (58 per cent), an ancient primitive people of the jungle of Ceylon whose humeri even when not perforated show a very thin septum according to the excellent observations of the brothers Sarasin, in the primitive Arkansas Indians and in the Egyptian humeri taken from old Libyan graves.

PERCENTAGE OF OCCURRENCE OF SUPRATROCHLEAR HUMERAL FORAMEN (MARTIN)

1. Veddas.....	58
Arkansas-Indians.....	58
Old Libyans.....	57.2
2. Saladoans.....	53.9
Old Mexicans.....	52.4
3. Andaman.....	48.5
Paltacalo Indians.....	44.4
4. Guanches.....	39.5
Louisiana Indians.....	38.5
5. Polynesians.....	34.3
6. Negrito.....	33.3
Lower Californians.....	32.3
Mound Builders (Indians).....	31.2
Nialithies of Cave-aux-Fees.....	25
7. Swabians and Alamans.....	23
8. Neolithics of Montigny-Esbly.....	22
Negroes, African.....	21.7
Peruvians.....	20.8
9. Cibola Indians.....	19.6
Calcuacui.....	18.4
Bajuvaren.....	15.3
10. Melanesians.....	14.1
Japanese.....	13
Terra del Fuego.....	11
Italians.....	10
Sardinians.....	9.4
Old Patagonians.....	8
11. Aino.....	7.9
Bohemians.....	7.7
Parisians (4th to 12th centuries).....	5.5
White Americans.....	4.2
Parisians (Middle Ages).....	4.1
1. Primitive people of the Ceylon jungle.	
2. Indians of the Salado or Salt River Valley.	
3. Inhabitants of islands, near the Bay of Bengal.	
4. Canary Islanders.	
5. Inhabitants of Polynesia and Melanesia.	
6. Pigmies of the Oceanic Islands.	
7. Swabians: Southern Germans, Early Christian era.	
Alamans: Former tribes inhabiting the lower Rhine, Bavaria and parts of Switzerland.	
8. Men of the Stone Age.	
9. Ancient Indians of the Zuni Valley.	
10. Inhabitants of islands east of Australia.	
11. Aborigines of Japan.	

The lowest percentage is given by the Parisians of the Middle Ages, and white

FREQUENCY IN PERCENTAGE OF SUPRATROCHLEAR FORAMEN ACCORDING TO SEX AND SIDE (MARTIN)

	Sex	
	Male	Female
Guanchen.....	32.0	42.0
Andaman.....	31.2	53.8
Lower Californians.....	16.7	64.7
Japanese.....	7.3	28.1
Aino.....	5.6	22.2

	Side	
	Right	Left
Paltacalo Indians, male.....	36.4	41.2
Paltacalo Indians, female.....	41.9	56.0
Salado-Indians.....	44.1	63.0
Egyptians.....	36.2	47.8
Lower Californians.....	23.5	42.9
Mound builders.....	20.0	37.0
Calcuacui.....	18.7	36.4
Negro and Mulatto.....	18.1	44.4
Schwaben and Alamannen.....	17.2	28.1
Malays.....	13.0	21.7
Peru.....	8.3	33.3
Cibola Indians.....	6.7	32.2
Whites.....	3.7	11.5

Americans. Hultkrantz found the foramen in 4.7 per cent of 150 recent males' arms of Swedes, in 14.8 per cent of 54 females, in 15.4 per cent of 52 humeri from the Stone Age, in 0 per cent of 59 humeri of Lapps.

From the data one is also permitted to infer that the characteristic is not confined to any one race, and that it has greater frequency in the female and on the left side.

The question naturally arises, of what significance is the foramen? Why is it disappearing from the humeri of modern men? Why is it more frequent in the female and on the left side? If it can be proven that there is any relationship between the presence of the foramen and an increase in the flexion and extension amplitude at the elbow joint, its significance would be apparent. It would then mean that there has been an adaptation to functional needs and that, on the whole, modern man has lost to a certain degree the range of these particular motions

possessed by his prehistoric ancestors and animals in whom this foramen is a more or less constant finding; and that this character is in recession and will eventually disappear. The little motion modern man has lost by this change has, of course, been more than compensated for by the general greater latitude of motion in other directions, made possible by greater obliquity of the condylar portion than exists in primitive man and animals.

It is true that the foramen appears to be associated with an increase in the ampli-

Since the perforation was found in adolescents but not in infants, they considered it plausible that the foramen was acquired, not inherited. They concluded that the foramen resulted from mechanical pressure due to strenuous extension movement of the arm. In the particular group it was the activities of corn grinding by means of larger and smaller stones held in the hands of the operators, to which they ascribe the cause of this foramen. Such labor is of course common among the aborigines of the southwest, both ancient



FIG. 3. P. McC., male, aged nine, right arm. Supra-trochlear foramen and old oblique fracture of the external portion of the diaphysis through the foramen.

tude of the extension movements in the joint. This is only slight in the fully formed joint, for the extent of the extension movements of the elbow are then affected by the ligamentous and muscular structures. But in one case of bilateral foramen (W. H., aged twelve years) hyperextension was marked. The foramen cannot be important and essential from this viewpoint because of its great variability, both in animals and in man.

Matthew and Lamb, in a study of the humeri of an ancient tribe of Indians of the Salt River Valley, the Saladoans, whose remains were found in mounds which also disclosed an old civilization, were struck by the frequency of this foramen in the adult and adolescent.



FIG. 4. D. B., male, aged ten. Supratrochlear foramen, double, the left side larger than the right. Evidence of old fracture of external portion of diaphysis.

and modern, the females of the modern pueblos being engaged during the greater part of their time in grinding corn, a task they begin to perform while young. The higher frequency of the foramen in the females than among the males was explained on this basis. They accounted for its preponderance on the left side by supposing that the left arm is more frequently and forcibly used than the right, in this particular labor.

These ideas are given at length in order to show how ingenious though entirely fallacious is reasoning and deduction when based on insufficient data and evidence. The presence of this perforation (as disclosed by the roentgen-ray examination) in living individuals of different nationalities, both children and adults, who have not indulged in any extraordinary muscular movements, is sufficient to demolish any hypothesis based on the theory of trauma.

The process of absorption is undoubtedly

associated with and influenced by modification of the blood supply. The nutrient vessels, which are chiefly supplied from the inferior profunda, enter this portion of the bone by nutrient foramina which are intra-articular, visible in radiographic

ing living material permit him to contribute valuable data, has concerned himself so little with the subject. The foramen has not only a theoretical but also a practical bearing because of the frequency of fractures in this portion of the bone. It might



FIG. 5. F. K., aged sixteen. Left supra-trochlear foramen. Note the two tubercles, one on the anterior external aspect, and one on the posterior internal aspect of the foramen.

studies in the upper contour of the foramen, one on either side.

At about the seventh year the ossification of the trochlear epiphysis begins and the growth of this part of the bone proceeds rapidly. It is at this time that the bony plate between the coronoid and olecranon fossae becomes cribriform, lamellar atrophy begins, the intralamellar spaces enlarge and absorption finally takes place of the central part of the septum.

It may be that the formation of the foramen is a phenomenon secondary to incomplete and insufficient vascularizations which, as evolutionary development proceeds, has become corrected and compensated for. The greater frequency in the female and on the left side may be explained by the hypothesis that the female humerus and the left humerus are, as a rule, somewhat less developed than the right. The factors may contribute to make the bony septum on the left side thinner than the right. Schinz states that the foramen is an hereditary characteristic.

The anatomist, zoologist and anthropologist all have shown an interest in this foramen and it is surprising that the roentgenologist, whose opportunities for study-



FIG. 6. E. C., female, aged twenty-three. Left supra-trochlear foramen. Note the supracondyloid process, a sharp spur formation above the median epicondyle.

seem that in the presence of this foramen greater difficulty might be experienced in getting perfect anatomic and functional restitution.

An increase in illumination of this area is seen under normal conditions because



FIG. 7. J. J., male, aged fifty. Large supra-trochlear foramen containing ossicle. Productive arthritic changes.

of the comparative thinness of this portion of the bone, but all lamellar markings must be absent and the foramen must be ringed with a thin edge of compacta, for the correct diagnosis. The foramen is usually oval except when deformed as a result of frac-

ture (Cases 1 and 11) (Fig. 3). The long axis is parallel with a line between the epicondyls. The oval contour is normally modified by the presence of small spurs, one on the upper and inner, and one on the lower and outer contour of the foramen, a conformation similar to that which exists in the gorilla. The roentgen-ray studies of the living would indicate that it is frequently double and always larger on the left side.

The frequency of a fracture through the lower one-quarter to one-half inch of the diaphysis in children under six may be explained by the existence of the foramen. It is rare for epiphyseal separation to take place. Though the very elastic nature of the epiphysis plays a part in its preservation, it is the weakness of this portion of the bone because of the thin septum or foramen between olecranon and coronoid fossae which predisposes it to fracture.

In supracondylar fractures where the line of fracture extends through the region of the foreman, the indented edge of the foramen may be made out in the lower fragment.

Above the olecranon there is sometimes present a detached rounded ossicle, the *sesamum cubiti* (Pfitzner). Cases VII and VIII (Fig. 7) show this rather large rounded nucleus of bone. It appears to lie within the foramen, the edges of which are considerably thickened. It is not to be mistaken for the center, or centers (two to three) of ossification of the epiphysis showing through the supratrochlear foramen. These appear from the tenth to the thirteenth year and fuse from the sixteenth to the twentieth year.

As a rule, this ossicle is seen well behind the humerus but because of the foramen it may come to lie within it, being pressed

into this position by the triceps. If there are arthritic changes in the elbow, these sesamoids partake of the productive changes and may become very large. If the olecranon process is the analogue of the patella, this sesamoid may correspond to the suprapatellar ossicle.

SUPRATROCHLEAR FORAMEN						
Name	Sex	Age	Weight	Right Arm	Left Arm	Fig.
P. McC.....	M	9	...	Regular	No film	3
D. B.....	M	10	75	Regular	Irregular	4
W. H.....	M	12	102	Regular	Regular	*
F. K.....	?	16	...	No film	Regular	5
A. S.....	M	22	175	Absent	Regular	*
E. C.....	F	23	...	No film	Regular	6
P. K.....	M	32	145	Regular	No film	*
J. J.....	M	30	...	Regular	No film	7

[\* This and several other illustrations omitted to conserve space.—Ed.]

SUMMARY

1. The supratrochlear foramen should be looked for in the roentgenogram and noted, not only because of its clinical but also because of its anthropological interest.
2. It is not found before the age of six years and is usually bilateral.
3. It is more common in the female and is usually more characteristic and larger on the left sde.
4. It is an anatomical variation and must not be misinterpreted in injuries to the elbow.
5. An increase in hyperextension was found in association with a bilateral supratrochlear foramen in a child.
6. A spherical ossicle is described, probably the *sesamoid cubiti* of Pfitzner, which has been pressed into the foramen by the overlying structures.





# RESULTS OF ORTHOPEDIC TREATMENT IN DYSTONIA

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NEW YORK

**D**YSTONIA musculorum is one of a group of neurological conditions or symptom-complexes in which the clinical diagnosis is based on abnormal motor activity and in which the pathological lesion is in the motor nuclei of the extrapyramidal tracts. According to Professor Jacob of Hamburg degenerative changes have been found in the striatum, caudate nucleus and putamen, pallidum and the substantia nigra and nucleus ruber. The nucleus ruber acts as a relay for the fibers from the cerebellum and controls the function of coordination and tone of synergistic muscles. It is here that the dominant lesion in dystonia is thought to exist. There is a dissociation in synergy among muscle groups and the tone which allows of orderly purposeful movements is disturbed.

The essential feature of this condition is alternation in tone of single muscles or groups of muscles resulting in quivering, twitching and spasms, and movements that are bizarre and different from any other movements. Because of their difference and similarity they may be compared with tics, choreas, spasms, tremors, convulsive movements, clonus, athetoses, etc. The voluntary movements of the patient take place with the dystonic elements superimposed. They are present continuously except in sleep and in narcosis. They can be diminished by voluntary control and are markedly influenced by psychical conditions. If intentionally decreased in one area they will be increased elsewhere. In that regard they differ from paralysis agitans.

In past years these cases have been described as hysterical conditions and it

is only since 1908 that they have been recognized as a distinct entity variously designated as tonic torsion spasm, torti pelvis, dysbasia lordotica progressiva, etc. In 1911 Oppenheim, recognizing the essential element of abnormal tone, applied the term dystonia musculorum deformans, which is usually accepted. Epidemic encephalitis is known to be the causative factor of the degeneration in many of the cases and is the only known cause. Other encephalitic sequellae may complete the picture and elements of paralysis agitans and other physical conditions may coexist.

Most of the cases have begun in childhood. The onset is gradual. Several years may elapse before the condition is marked. At times it may seem to develop rapidly. It may become stationary just as other neurological conditions do that are the result of degenerative central lesions. Pathological examination may show no active lesion in the cerebrum in post-encephalitic cases. However, the result on the muscular system due to the constant twitching may lead to progressive atrophies, contractures and deformities. The condition is not fatal. Taken all in all it seems to be progressive. I know of only one case which I have observed for ten years in which I can speak definitely of improvement. This patient can now control his movements so that he earns his living; he can write; and last year he had sufficient control to drive a Ford car from Florida to New Haven.

Three cases in which the torsion and deformity were extreme were treated by prolonged immobilization in corrective plaster casts. The cases selected were the worst, those whose distorted positions

and deformities of motion tortured them excessively. Other cases untreated act as a control for us.

**CASE I.** R. E. entered Montefiore Hospital September, 1921, aged seventeen years, with a history of encephalitis in September, 1920, and onset of twitching in the feet in December, 1920. She was able to walk when admitted but became progressively worse. In July, 1924, a cast to correct complete flexion contraction of one knee and hip was found impractical. The plaster on the lunar-shaped foot had to be removed early to prevent pressure sores. From September, 1924, to date she has been in a long double spica. Under anesthesia, the

than in previous years and claims to have been benefited by the plaster. (Fig. 1.)

**CASE II.** J. S. entered Montefiore Hospital May, 1922, aged seventeen years. In January, 1920, there was onset of what was probably encephalitis. She had been at Mt. Sinai Hospital for observation for abdominal pains and mental depression and became noisy, excited and confused. Her dystonic course was more rapid than that in Case I. Her extreme flexed position in September, 1922, led us to put her under anesthesia in a double spica. We kept her in plaster for one and one-half years. In a psychotic episode she became maniacal and unmanageable and we were forced to



FIG. 1. Case I. Six weeks after the plaster has been removed, showing deformities of hands and feet and a distinct improvement in the position of the knees, hips and trunk.

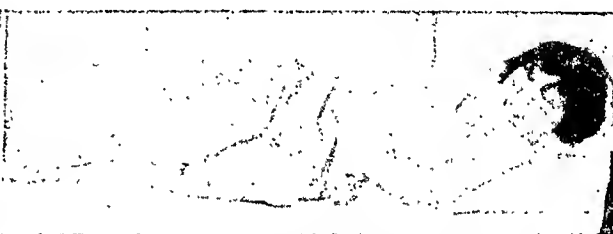


FIG. 2. Case III. One month after removal of plaster showing a flexion-contraction of hips and knees and torsion of the trunk of a different pattern than at onset.

muscles relax but the contractures of the joints remain in part, depending on the duration and severity of the deformity. The knees and hips were straightened without undue difficulty but the feet were rather rigid and the deformity was therefore only partially corrected. She had marked adduction spasm of the hips. A long double plaster spica including both feet was successfully kept on several months at a time. On removal of the plaster the limbs went back to their former positions, the spasms causing intense pain. Reapplication of the casts required anesthesia and morphine. For two and a half years this procedure was maintained. The last spica was applied without narcotic or anesthesia. The patient has now been two months without plaster. The contractures of the knees and hips have subsided, the twitching and spasms persist but are diminished. The limbs are held rigid, the motions are limited, there is marked atrophy of the lower extremities, less so of the upper. There are no hypertrophies.

She had required morphine but has had none for some time. She is more comfortable

discharge her from the hospital. Since then she has been at the Metropolitan Hospital without plaster but she is given morphine to which she has become accustomed. Her condition today is much better than when she was at Montefiore Hospital. The severe contractures of the lower extremities are gone, the hips and knees have remained in extension. The feet still have the semilunar or varus position. A fine quiver or twitching is present in all the muscles, which is increased on extending the muscle. Voluntary motion is limited. A fair amount of atrophy is present in all the muscles. At times she gets attacks during which her knees and hips flex. About three years ago the operation suggested by Roy and Hunter, a separation of the sympathetic fibers from the brachial plexus was done on the right side. It was followed by a total paralysis of that extremity and a gradual recovery. There is slightly diminished sensation over some areas of the arm, marked atrophy of biceps and triceps and hypertrophy of the hand flexors. The extremity is less rigid but not free from dystonia. She says the

operation has improved her arm because now she can write while before she could not.

CASE III. Admitted to Montefiore Hospital in 1920, aged nineteen years. No history of encephalitis. Had attacks of emotional instability, turned her feet involuntarily into varus, wore plaster and braces. She improved and was discharged after a year and a half in the hospital. Neurologists doubted the existence of any organic lesion. Diagnosis, psychoneurosis. In July, 1924, after being out a year she was readmitted with well-marked dystonic movements of hands and feet. In December, 1925, she suddenly started with extreme flexor contracture of knees, hyperextension of thighs and lordosis. From February, 1925, to within a month ago she has been in plaster casts in corrected position. She claimed to be more comfortable that way. She has had periods of circulatory disturbance which forced us to open the plaster casts; but we were able to continue them. The flexion of the knees and thighs has returned in part, is less severe and painful and under better control.

These cases are from the neurological wards of Montefiore Hospital and the service of Dr. S. P. Goodhart to whom I am indebted for permission to report them and for the use of his moving pictures. These latter are a part of a large and extensive series made by him for study of motion and for teaching. It was at his instigation that these attempts were made to relieve an unbearable condition. We knew that it was impossible to keep a plaster cast on a foot on account of the small surface for pressure and the strength of the muscles. For a thigh and a knee and trunk correction we have larger surface and greater leverage and were able to maintain the splints without any pressure sores these several years. The cause of the disease, being a lesion of the central nervous system, could not be modified by our work. The object was to prevent severe deformity and to relieve the patients from a worse condition. It is only applicable in certain severe cases involving the thighs and trunk. I do not recommend it for the foot, hand or neck.

My main objection to the procedure is the morphinism which resulted and which we later cured in two of the three cases. There is no treatment by drugs or nerve-cutting operation that can be considered. In favor of the treatment is the feeling and opinion of the patients. They claim to be helped. I am inclined to discount their statements, but even so, they should be given consideration. I was rather opposed to the procedure all along but when I look back and analyze each case dispassionately I must confess they were helped. Unless we intend to carry this out to a logical conclusion and keep the casts on continuously for years we should not begin; a few months only makes matters worse. Anesthesia and morphine are necessary and only the extreme cases should be considered.

Atrophy exists in my three cases. It exists in the other cases also even if not marked. It is an advantage to the patient. When the muscle action is slight we see hypertrophies; when it is excessive we see atrophies. I think the muscles get worn out from overstimulation and inability to get rest. I was disinclined to report these cases but I feel it is my duty to do so, that the work should not be done again from an experimental point of view, and that the limitations to this treatment be better known.

## PRESENTATION OF CASES

### POSTOPERATIVE RESULT IN A CASE OF DISLOCATION OF THE ANKLE WITH FRACTURE AND AVULSION OF THE HEAD OF THE ASTRAGALUS

CHARLES OGILVY, M.D.

R. H., aged nineteen years, when coasting while seated on a sled with her feet forward, ran into an automobile at the foot of the hill. The impact was so sudden and severe that she does not know what happened in the collision. When picked up she was unable to stand and was taken to the hospital.

An hour after her admission I saw her and the roentgenograms taken at that time showed

a fracture-dislocation of the left ankle, the foot being dislocated outward and the dislocation taking place at the tibio-tarsal joint. (Fig. 1.) The films also disclosed what appeared to be the upper portion of the astragalus



FIG. 1. Fracture-dislocation as it appeared immediately after the accident.

outside of the capsule and lying beneath the skin on the inner side of the ankle. This, upon operation, proved to be the head of the astragalus, there being a fracture through the neck of that bone.

The patient was immediately taken to the operating room where, by extension, the lateral displacement was corrected. Another roentgenogram then showed the foot in better alignment, but not reduced as far as the ankle-joint itself was concerned, there being a space left between the articulating surfaces of the tibia and the astragalus.

An incision 3 inches long was made over the lower and inner border of the ankle over the prominence made by the displaced bone and sweeping around the front of the ankle joint. Much to my surprise, I found that the head of the astragalus was that which had broken loose and was protruding beneath the skin on the inner side just anterior to and below the malleolus.

The remaining portion of the astragalus had rotated so that the fractured surfaces of the neck were thrown upward instead of forward, and the body of the astragalus was carried forward against the surface of the scaphoid. This was replaced without great difficulty.

I then attempted to replace the head of the astragalus, but could not do so because of obstruction by the tibialis posticus. This was severed in an oblique direction, and the head of the astragalus was with some diffi-



FIG. 2. Postoperative result. Anteroposterior view.

culty replaced and fitted accurately in its normal position. (Fig. 3.)

The tendon was then reunited with No. 0 chromicized catgut and the head of the astragalus was retained in position by chromi-



FIG. 3. Postoperative result. Lateral view showing the fracture through the neck of the astragalus.

cized sutures through the periosteum. The apposition and fixation thus obtained were so good that drilling of the bones for deep ligatures was deemed unnecessary.

The wound was closed with chromicized catgut for the deep, and plain catgut for the

skin, sutures. The foot was put up at right angles with slight inversion and a plaster of Paris cast was applied.

Passive motion was begun in two weeks; active and passive motions were carried on in three weeks, and weight-bearing was allowed five weeks after the operation. In two months the patient was walking with but a very slightly perceptible limp.

There has been absolutely no trouble since. Perfect function has resulted, with not the slightest curtailment of any activities, such as dancing, skating, etc.

My object in presenting this patient's case is to emphasize first, the importance of treating these cases as soon as possible after the injury, and second, the all-important point of beginning active and passive motion early. This should be begun, in my opinion, as soon as it is possible to move the joint without severe pain.

### THREE CASES OF FAMILIAL CLAWFOOT WITH ABSENT TENDON REFLEXES

CHARLES ROSENHECK, M.D.

These three cases are in one family, mother, daughter and son. The ages are, respectively, thirty-six, sixteen and eight years. They all present marked pes cavus and claw-foot with abolition of all the deep tendon reflexes of both upper and lower extremities. There were no sensory disturbances and practically no demonstrable atrophy in the distal parts of the involved extremities. The mother and son show no gait disturbances but the daughter walks with a "steppage" gait due to weakness of the dorsiflexors of the feet. She also shows considerable weakness of the grip in both hands. The electrical reactions are normal in mother and son but the daughter shows a qualitative and quantitative diminution to faradism in the weakened dorsiflexors of the feet. The Wassermann blood reaction is negative in all three patients. Lumbar puncture was not done.

The cases are typical of the Charcot-Marie-Tooth type of progressive neuromuscular atrophy with the notable exception that the progressiveness of the symptoms is apparently lacking, the affection involving the feet only, producing the typical foot deformity and assuming a stationary character. This has

prompted Roussy and Levy of France and Symonds of England to consider them as a definite clinical entity. They have therefore proposed to designate these cases as "Charcot-Marie-Tooth neuromuscular atrophy (formes frustes)."

While it appears somewhat unnecessary to add nosological entities to an already well-recognized affection which obviously may show variations in the clinical picture or concept of the disease, the occurrence of such a distinct foot deformity with absent tendon reflexes in three members of one family is unique and worthy of classification.

### PARALYTIC DEFORMITIES OF ELBOW AND WRIST: PRELIMINARY NONOPERATIVE CARE

WALTER TRUSLOW, M.D.

BROOKLYN, NEW YORK

This patient, with much deformity at elbow, wrist and hand, is presented to reemphasize that much can be accomplished in lessening deformity and improving function by mechanical means alone; and to state that it should be a general principle to accomplish as much as possible by mechanical means before operating. I believe that a higher degree of final function is thus assured and that the operative needs are better understood after mechanical and reeducative means have restored what may be restored thereby.

This girl, A. O., aged twelve years, came to me a year and a half ago, with marked deformities and disabilities of the left elbow, wrist and hand. She was said to have been normal at birth. At two years of age she apparently had an attack of poliomyelitis, although the acute symptoms were so light that no diagnosis was made. There had been inadequate protective care of the parts involved, and she presented to me a flexed forearm, which was held in extreme supination, the distal radius being carried much lower than the distal ulna. The hand was carried down in reverse wrist-drop, the thumb being lower than the fifth finger. There was marked relaxation of the lateral ligaments of the wrist on the ulnar side, with much separation between the ulna and the ulnar carpus.

Examination showed a freely active flexion at the elbow, but an extension limited to 130 degrees and a faulty carrying angle. Believing

that there was no true bone block at the elbow, I determined to try a gradual overcoming of the extension limitation by plaster of Paris dressings and wedgings. The forearm could freely supinate and oversupinate but pronation was very weak as a voluntary act and was much limited passively. An examination of roentgen-ray films showed bowing antever-sion of the lower 2 inches of the ulna, which seemed to account for the oversupination and the limited pronation of the forearm. I believed then and do now believe that this ulna deformity will have to be corrected by osteotomy and realignment, but I planned to see what the plaster of Paris dressings could do for this. There was a separation of nearly an inch between the ulna and the ulnar carpus. The hand was carried to the radial side and there was no ulnar flexion power. It was concluded that there were greatly stretched wrist ligaments on the ulnar side. The hand dangled in reverse wrist-drop and with the radial side lower, the palm forward. There was no voluntary power of thumb adduction or of finger flexion. It was planned that the plaster of Paris dressing should reverse the faulty carrying positions of the hand, the thumb and the fingers.

I outlined as much correction of deformity and restoration of power as possible by plaster of Paris dressings and bracing and by gradual muscle reeducation, and operation later to correct what was not correctible by mechanical means.

The first plaster of Paris dressing was applied in October, 1925. It extended from the left axilla to the finger tips. The elbow was held by the dressing at 130 degrees' flexion, the forearm in supination (not in the habitual oversupination), the hand was flexed and carried to the radial side, and fingers and thumb were flexed. At the end of one week, the first elbow wedging was done, an angle of 130 degrees was opened up to 150 degrees. At one week more, the second wedging brought the angle to 165 degrees. The faulty carrying angle was lessened in these wedgings.

The plaster of Paris dressing was removed four weeks after its application and the following improvements were noted:

1. Elbow can be straightened to nearly normal, with a fair carrying angle. No voluntary extension power observable.

2. Wrist does not reverse drop easily, but

there was no voluntary flexion power. The hand was less radio-flexed.

3. Fingers can voluntarily flex weakly; thumb can adduct feebly.

It was judged time to begin muscle training, while continuing to protect and hold the improved positions. A posterior plaster of Paris splint was made, extending from elbow to finger tips, forcing the elbow, holding the fingers flexed, the thumb adducted and the hand radio-flexed. The patient was instructed to exercise the elbow as freely as possible and to remove the splint once a day for finger-flexion and wrist-flexion exercises, which were shown her.

For six months, this was the procedure, broken once by a two weeks' return to fixed plaster of Paris dressing, elbow to finger tips, to rest fingers and thumb in a flexed position. She was intelligent and faithful to her exercises, which were increased from time to time.

By April, 1926, six months after starting supportive and muscle-training care, there was much return of power in finger flexors and in thumb adduction. At that time a special brace was made, extending from axilla to finger tips. It has a free elbow joint, controlled by a stout elastic strap to aid extension. At the wrist there is a stop-joint allowing flexion only.

She has worn this brace since then, improving her elbow extension power, maintaining the hand in neutral, that is, preventing radio-flexion. By continued faithfulness in her special exercises and by persisting in using her left hand in daily school and home occupations, she has attained muscle power which she did not have a year ago.

A few days ago the results attained by mechanical treatment and muscle education were tabulated, as follows:

1. Elbow: deformities of flexion and of faulty carrying angle practically overcome, and beginning return of voluntary extension power.

2. Forearm: greater range of pronation and of voluntary pronation.

3. Wrist: reverse wrist-drop deformity nearly overcome, some degree of voluntary wrist flexion, approximation of ulna to ulnar carpus attained, with improvement of the bone of the ulnar lateral ligaments and with considerable voluntary ulnar flexion. (Improvement in the lateral wrist drop deformity has been delayed by the bowing deformity of the ulna.)

4. Thumb: much voluntary power in adductors.

5. Fingers: much voluntary flexor power.

It is now proposed to perform osteotomy of the lower end of the ulna, with realignment of the distal fragment and to reinforce the ulnar lateral ligaments with transplanted fascia lata. It is believed that this will make the hand much stronger. What to do for

the weak elbow extensor muscles is not yet decided. Muscle reeducation will of course be continued.

It is repeated that, by delaying operation, this girl has attained much lessened deformity and much improvement in muscle control. The line of procedure by operative means is now much clearer than it was when first caring for the case.



#### [SURGICAL SUGGESTIONS]

**I**NTERMITTENT pain in the ear usually signifies a tubal condition. The pain of otitis media is constant.

**P**AIN in the ear is common after tonsillectomy and does not indicate an otitis.

**M**YRINGOTOMY performed too early, that is before the drum is actually bulging, carries the risk of infecting the space between the two layers of the drum and, therefrom, the mastoid cells.



# COMMENT AND CORRESPONDENCE

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## INGUINAL HERNIOPLASTY

To the Editor:—

Your editorial on Inguinal Hernia (the JOURNAL, March, 1926) is, to say the least, a real analysis of this unsettled subject. There is already an array of authorities who agree with either Koontz or Seelig but, personally, I feel that I have seen union between muscle and ligament in a sufficient number of cases to convince me that Koontz is correct. However, I doubt if such union ever takes place in the presence of tension except where the muscle is immediately torn away, as I found in a double hernia in 1903 where silver wire had been used by Halsted. In this case the whole suture bite separated in a straight line and was firmly attached to Poupart's ligament when I operated for recurrence.

Hamilton Russell is undoubtedly correct in his views, based on thirty years' experience, but our own Oschner went further nearly an equal number of years ago, when he maintained that hernia in children could be cured by any procedure that kept the sac empty and said further that if ever operation is undertaken, the simpler the better.

We have had recurrent hernias here from many different parts of the country, sent by the Veterans' Bureau, and they represent the work of many surgeons who were in the service and some that were done after the War. Our greatest problem, of course, has been the direct type.

In a great proportion of these cases, the reformed sac would suggest that too much tissue for sac reformation was left at the original operation. Of course, every man

doing much hernia work has his pet hernia hobby, and I am no exception to the rule; however, it has not gone to the point of thinking everybody out of step but me.

I have tried, during the past eight years, to improve on the results obtained in the eighteen years preceding that period, as mentioned in my last article on the subject and I feel that the results obtained by a combination of steps advocated by many have helped materially. They are about as follows:

Very complete eradication of the sac and the use of a purse-string suture introduced high inside the sac.

Careful obliteration of the abdominal ring after the purse-string method of Connell (of intestinal suture fame.)

Relaxation of the structures at the apex of the inguinal triangle by sutures in front of, rather than above, the pubic bone, as I described in *Annals of Surgery*, November, 1926.

Suture (as in Bassini operation) of internal oblique and transversalis to Poupart's ligament. I do this for support, as advocated by Bassini, and again to support the weak transversalis on the theory that such structures are stronger when supported by muscle.

The remainder of the operation is practically the Mayo utilization of the external oblique.

If facial strips are indicated they can be used with much greater ease if the tension sutures originally advocated are used.

WM. L. KELLER, M.D.

WALTER REED GENERAL HOSPITAL  
WASHINGTON, D. C.  
March 7, 1927





## ROBERT FULTON WEIR



THE death on April 6, 1927, of the venerable Robert F. Weir of New York marked the passing of a conspicuous figure in American surgery. Born in New York in 1838, he was graduated from the Free Academy (College of the City of New York) in 1854. In 1859 he received his degree in medicine from the New York College of Physicians and Surgeons. He served as assistant surgeon in the U. S. Army throughout the Civil War and was in

especially mentioned in connection with surgery of the joints and of the intestines. He was among the first to recognize duodenal ulcer as an entity. He made an important modification of the Murphy button for its use in gastroenterostomy. But his name is most often encountered in recent surgical literature as the inventor of appendicostomy. For many years he was attending surgeon at the New York and Roosevelt Hospitals. For several years, too,



Robert Fulton Weir (1838-1927).  
(From a portrait by John A. Weir, Courtesy  
of the New York Academy of Medicine.)

charge of a hospital at Frederick, Maryland, from 1862 to the end of hostilities. His later hospital and teaching positions in New York City added to his experience in the practice of pre-Listerian surgery. Both in that period and, especially, later, when antisepsis and then asepsis gave renaissance to surgery, he made many important contributions to his art and science. These touched on too many fields to list here, but perhaps he may be

he shared with William T. Bull the professorship of surgery at Columbia University, and thousands of students took their inspiration, in lecture hall and operating room, from these two loved teachers.

In the retirement of his advanced years, still in the city of his birth and activities, he looked back upon a long life of surgical achievements that won him the recognition of many foreign and American societies.

In 1895 he was made a member of the

Société de Chirurgie de Paris. In the New York Academy of Medicine hangs this portrait, in oils, of its one time president, Robert F. Weir, wearing the gown of the Royal College of Surgeons of London, which in 1900 gave him the unusual distinction of conferring upon him its honorary fellowship. In the same year he

became president of the American Surgical Association. When the American College of Surgeons was organized in 1913 he was one of five surgeons selected for honorary fellowship. At the time of his death he still bore the title of Consulting Surgeon to the Roosevelt, New York, St. Luke's and St. Vincent's Hospitals.



## CHARLES HOWARD PECK



PROMINENT among American surgeons and generally admired, Dr. Charles Peck of New York died of

consultant in general surgery both in the A. E. F. and later in the Surgeon General's Office. He was awarded the Distinguished



Charles Howard Peck (1870-1927).

pernicious anemia on March 28, 1927, at the age of fifty-six. He had been attending surgeon to the French Hospital and later, and for several years, to the Roosevelt Hospital, and was consulting surgeon to many hospitals in and about New York, and professor of clinical surgery, Columbia University College of Physicians and Surgeons.

During the World War he was Director of the Roosevelt Hospital Unit (Base Hospital 15) in Chaumont, and served as

Service Medal and was Colonel in the Medical Reserve Corps of the Army. He was a member of the New York Surgical Society and of the American Surgical Association, and had been chairman of the Section on Surgery of the American Medical Association and president of the Medical Society of the County of New York. He was perhaps especially interested in and best known for gastrointestinal surgery, and his operative clinics attracted visitors from many cities.

## BOOK REVIEWS

**THE TREATMENT OF FRACTURES.** With Notes Upon a Few Common Dislocations. By Charles Locke Scudder, M.D., F.A.C.S., Consulting Surgeon to the Massachusetts General Hosp., Fellow American Surgical Association; Ed. 10, 8vo. Cloth. \$12. Pp. 1240; 2027 illus., Phila. W. B. Saunders Co., 1926.

This splendid work, which has been before the profession for a quarter century, is too familiar to need extended review. In this tenth edition the treatise has been almost doubled in size. It has been increased in pages from 700 to 1200, and in illustrations from 1200 to 2000. Every part of the work has been thoroughly revised and much expanded. Thus, *Operative Treatment of Fractures*, which in the ninth edition was dismissed in a single chapter of 16 pages, now occupies six chapters of 160 pages. The short chapter on *Pathological Fractures* has been replaced by a longer one contributed by Joseph C. Bloodgood. There have been introduced also chapters on *Bone Repair* by Frederick W. Bancroft, on *Birth Fractures* based on the monograph of Edward D. Truesdell, and on *Massage* based on the monograph of James B. Mennell. There is a final new chapter on medicolegal considerations.

In its present form, Scudder's is much the largest, most complete and most modern, practical treatise on fractures in the English language. The spirit that appears to have guided the author throughout is to be found in his statements in the preface: "Rigid and strictly standardized methods of fracture treatment are undesirable and never can be developed. The variety of conditions attending a fracture will always compel the exercise of careful judgment in the choice of treatment."

**MANIPULATIVE SURGERY. PRINCIPLES AND PRACTICE.** By A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.); Surgeon, Seaman's (Dreadnought) Hosp., Greenwich. 8vo. Cloth. \$3. Pp. 168; 62 illus. N. Y. Macmillan Co., 1926.

This interesting and very readable little manual might be regarded as a companion to the author's "Internal Derangements of the Knee Joint"; and, so far as that articulation is

concerned, it covers some of the same ground. In the first chapter Fisher discusses the views of John Hunter, John Hilton, H. O. Thomas, Sir James Paget and Wharton Hood on rest and movement in joint affections, and in the second chapter he elucidates the varieties of conditions that respond to the manipulations of "bone-setters."

Most of this little book is given to manipulation of the knee and other joints of the extremities, but manipulative treatment of the spine is also included. Like Jones and Lovett, the author believes that subluxation of the sacroiliac joint as a cause of chronic backache has not been established. He emphasized that in the manipulation of dislocated meniscus of the knee, if the patient cannot fully and painlessly extend the joint, reduction has not been accomplished.

Indications, contraindications, technique and after-treatment are duly dealt with throughout. Fisher insists that manipulative surgery must be taught in our medical schools, and he adds: "Clinical lectures and demonstrations must be given at every hospital, for every out-patient department contains scores of cases which are 'crying out' for manipulation. Above all, there must be a fundamental change of outlook—a little more manly breadth of vision and of the true scientific spirit, and a little less of narrowness, pettiness, and of an attitude which condemns things because it cannot understand them, or because they are practised by persons outside the medical profession."

**ORTHOPEDIC SURGERY.** By W. A. Cochrane, M.B., CH.B., F.R.C.S.E., Asst. Surgeon, Royal Inf., Edinb. 8vo. Cloth. \$6.50. Pp. 528; 504 illus. N. Y. William Wood & Co., 1926.

The author of this manual is co-author with Philip D. Wilson of Boston of a book on *Fractures and Dislocations* which, published two years ago, has been everywhere received with warm praise. Cochrane was a pupil of Goldthwait, whose views on posture and bodily mechanics he sets forth in Part I of this work, of Osgood, also in Boston, and of Sir Harold Stiles. The book is strictly a student's manual, and is correspondingly condensed. But it is a modern exposition of orthopedics and par-

ticularly valuable in that it emphasizes the mechanistic problems involved.

We note that the author makes mention of brachial plexus pressure by the first rib, a condition described first by his fellow-townsmen, Bramwell, the neurologist, and treated surgically by Stiles, also of Edinburgh, but concerning which there has been exceedingly little in American literature.

The description of subdeltoid bursitis is in several respects faulty and appears to indicate a very limited experience with that affection. It gives the reader an erroneous impression concerning the significance and location of sometimes associated lime deposit and of its rational treatment.

**CLINICAL SURGICAL DIAGNOSIS FOR STUDENTS AND PRACTITIONERS.** By F. de Quervain, Prof. of Surgery and Director of Surgical Clinic, Univ. of Berne. Trans. by J. Snowman, M.D. English Ed. 4, 8vo. \$14. Pp. 937; 750 illus., 7 pl. N. Y. William Wood & Co., 1926.

This is a translation of the as yet unpublished ninth German edition. As its title indicates, the work emphasizes clinical as contrasted with laboratory diagnosis. It bears the individuality of the author and both in its profusion of illustrations and in its text it reflects the large experience of this Swiss master of surgery.

**BEOBACHTUNGEN UND ERGEBNISSE BEI EINER FÜNFJÄHRIGEN FRAKTURENBEHANDLUNG.** (*Klinische und unfallmedizinische Feststellungen*). By Dr. Hans Scheffler, Assistenzarzt am Krankenhaus Bergmannsheil in Bochum. 8vo. Price, M. 3. Pp. 85; 18 illus. Berlin: Julius Springer, 1927.

This brochure appeared first in the twenty-fourth volume of the *Archiv für Orthopädische und Unfall-chirurgie*. It was written with the purpose of presenting accurate information on the etiology, the type of treatment and the total period of disability of the various kinds of fractures exclusive of fractures of the pelvis, the skull and the spinal column. Though the author's material was drawn entirely from a mining population subjected to the injuries common in mines, many of the conclusions reached may with confidence be applied to the fractures ordinarily seen in any large city.

The author lays particular stress on the importance of immediate treatment of the

fracture as a factor in the early rehabilitation of the patient. Where traction was necessary, as in the case of fractures of the thigh or of the upper part of the arm, he apparently prefers skeletal traction to skin traction. In practically all types of fractures, the principle of "functional treatment" was adhered to rigidly wherever possible. This involves almost immediate institution of massage and mechanotherapy and the early active use of the injured limb. In cases treated in this manner, before the development of a firm bony callus, the author shows that the total period of treatment was seldom more than two or three weeks longer than the time required for the appearance of a firm callus. In this manner, the long periods of neurasthenic disability are avoided and the hopeful mental attitude of the patient is maintained. To achieve such results, it is the author's opinion that the fundamental principle of immobilizing both the joint above and below the site of a fracture must be completely disregarded and the use of circular plaster bandages must be completely discarded.

**ORGANISATION UND ORDNUNGSGEMÄSSER BETRIEB DES OPERATIONSSAALS.** By Prof. Dr. Max Kappis, Hannover. Paper. 16mo. Price, M. 4.80. Pp. 199; 28 illus. Leipzig: Georg Thieme, 1927.

As a result of his efforts in the construction of a new surgical pavilion at the hospital with which he is connected, the author has had to formulate definite opinions on the details of construction and management of the operating theater. The problems of sterilization, the type of instruments to be used, the linen, suture material and the thousand and one minutiae, which every surgeon expects in the operating room without knowing in particular how they are prepared, are discussed in this little work with a thoroughness and conciseness which should recommend it both to the surgeon and to the hospital executive. The work is the crystallized thought of many years of active surgical practice and the opinions are practical.

**DRINGLICHE OPERATIONEN.** By Prof. Dr. Alexander Tietze, Primärarzt am Allerheiligenhospital in Breslau. Ed. 2. Cloth. 8vo. Price, M. 33. Pp. 872; 384 illus., some col. Stuttgart: Ferdinand Enke, 1927.

This volume on "urgent operations" is concerned not only with traumatic surgery but also with conditions of any sort in which the

indications for operation are urgent or in which the consequences of surgical interference are apt to be especially serious. Large portions of the work are devoted to a discussion of the problems of war surgery.

The first part of the work is dedicated to a discussion of problems of general interest, such as the type of narcosis, transportation of the injured, infections and technique. The second part of the work is devoted to a description of the injuries of the various organs of the body. No attempt is made to outline the steps of the surgical procedures. The author confines himself to a description of the indications for operation and a discussion of different symptom-complexes. Numerous illustrative case histories are interspersed and many good photographs and schematic drawings enliven a very easy reading, interesting text.

**DIE CHIRURGIE.** Eine zusammenfassende Darstellung der allgemeinen und der speziellen Chirurgie. Ed. by Prof. Dr. M. Kirschner and Prof. Dr. O. Nordmann. Part 13. **DIE CHIRURGIE DES GESICHTS, DES OBERKIEFERS UND DES UNTERKIEFERS, EINSCHLIEßLICH DER ZÄHNE.** By Prof. Dr. R. Klapp, Dr. F. Bange and Priv.-Doz. Dr. F. Ernst, Berlin. **DIE CHIRURGIE DER NASE UND DER NEBENHÖHLEN.** By Prof. Dr. H. Beyer, Berlin. 8vo; Pp. 399; 410 illus., 5 col. pl. Berlin: Urban & Schwarzenberg, 1927.

In this installment of the new system of surgery the standard of excellence established by the previous authors is maintained. The concise yet complete presentation of the different surgical conditions is preceded by an excellent chapter on the anatomy and embryology of the part under discussion. In its very nature, the subject of surgery of the face, the mandible and the maxilla predicates the ability to restore the contour of the part injured in the surgical manipulations. This part of the work is described in a particularly interesting and able manner.

## BOOKS RECEIVED

**SOUTH AMERICA.** Amplified to Include all of Latin America; The Vandyck Cruise. By Franklin H. Martin, C.M.G., D.S.M., M.D., LL.D., F.A.C.S.; Director-General, American College of Surgeons; Editor, Surgery, Gynecology and Obstetrics; President, Gorgas Memorial Institute of Tropical and Preventive Medicine, Inc. Revised Ed. 8vo. Cloth. \$3.00. Pp. 435; illus. N. Y.: Fleming H. Revell Co., 1927.

**A TEXTBOOK OF EXODONTIA. (EXODONTIA, ORAL SURGERY AND ANESTHESIA.)** By Leo Winter, D.D.S., Prof. of Oral Surgery, N. Y. Univ. College of Dentistry, etc. 8vo. Cloth. \$7.50. Pp. 364; 329 illus. St. Louis: C. V. Mosby Co., 1927.

**BEOBSACHTUNGEN UND ERGEBNISSE BEI EINER FÜNFJÄHRIGEN FRAKTURENBEHANDLUNG.** (Klinische und unfallmedizinische Feststellungen). By Dr. Hans Scheffler, Assistenzarzt am Krankenhaus Bergmannsheil in Bochum. 8vo. Cloth. M. 3. Pp. 85; 18 illus. Berlin: Julius Springer, 1927.

**THIS BUSINESS OF OPERATIONS.** By James Radley. 16mo; Pp. 96. Cincin. Digest Publishing Co., 1927.

**OUR OWN AND OUR COUSINS' EYES.** By Thomas Hall Shastid, M.D., F.A.C.S., LL.D. 8vo; Pp. 199. Southbridge, Mass.: American Optical Co., 1926.

**MINERAL WATERS OF THE UNITED STATES AND AMERICAN SPAS.** By William Edward Fitch, M.D., Assistant Gynecologist, O.P.D., Presbyterian Hosp., N. Y. 8vo. Cloth. \$8.50. Pp. 799; illus. Phila.: Lea & Febiger, 1927.

**PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences.** Ed. by Hobart Amory Hare, M.D., LL.D., Prof. of Therapeutics, Materia Medica and Diagnosis, assisted by Leighton F. Appleman, M.D., Instructor in Therapeutics, Jefferson Medical College, Phila. Vol. 1, March, 1927. 8vo. Pp. 294. Phila.: Lea & Febiger, 1927.

**INFECTIONS OF THE HAND.** By Lionel R. Fifield, F.R.C.S. Surg. Registrar, First Assistant and Demonstrator of Anatomy, London Hosp. 12mo. Cloth. \$3.25. Pp. 192; 2 col. pl., 67 illus. N. Y.: Paul B. Hoeber, Inc., 1927.

**TRANSFUSION OF BLOOD.** By Henry M. Feinblatt, M.D. Assistant Clinical Prof. of Med., Long Island College Hosp., Brooklyn, N.Y. 8vo. Cloth. \$3.00. Pp. 137; 24 engrav. N. Y.: Macmillan Co., 1926.

**A STATISTICAL SURVEY OF THREE THOUSAND AUTOPSIES.** From the Department of Pathology of the Stanford University Medical School. By William Ophüls, M.D. Vol. 1, No. 3. 8vo. Paper. \$2.50. Pp. 246; 16 charts. Stanford Univ. Press, 1926.

**THE ARTIFICIAL LIGHT TREATMENT OF CHILDREN.** In Rickets, Anaemia and Malnutrition. By Katherine M. L. Gamgee, M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H. (R.C.P.S.). Formerly Ass't Medical Officer of Health for Maternity and Child Welfare, Hull. Introduction by Prof. Leonard Hill, M.B., F.R.S., Director, Dept. Applied Psychology and Hygiene, National Institute for Medical Research. Cloth. \$4. 8vo. Pp. 192; 16 pl., 5 ch., 33 text illus. N. Y. Paul B. Hoeber, Inc., 1927.

**THE QUARTZ MERCURY VAPOUR LAMP.** Its Possibilities and Uses in Public Health and General Practice. By J. Bell Ferguson, M.D., D.P.H., Medical Officer of Health, Tuberculosis Officer and School Medical Officer, County Borough of Smethwick. Introduction by Sir Henry J. Gauvain, M.A., M.D., M.C. Medical Supt., Lord Mayor Treloar Cripples Hospital. 8vo. Cloth. \$2.50. Pp. 118; 38 illus. (13 pl.). N. Y. Paul B. Hoeber, Inc., 1927.

# PROGRESS IN SURGERY

*Selections from Recent Literature*

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FREEDLANDER, SAMUEL OSCAR, Cleveland. The treatment of tetanus. *Ann. Surg.*, March, 1927, lxxxv, 405.

Twenty-five consecutive cases of tetanus were treated with large frequently repeated intravenous injections of antitoxin, with a mortality rate of 36 per cent. Eleven of these had an incubation period of less than ten days with a mortality rate of 45.5 per cent. If the six cases which died before sufficient antitoxin could be administered are excluded, the mortality rate would be 12 per cent. The relatively low mortality rate in this series adds to the impression that tetanus antitoxin given in large doses intravenously has some therapeutic value.

TEACHENOR, FRANK R., Kansas City. Intracranial complications of fracture of skull involving frontal sinus. *J. Am. M. Ass.*, March 26, 1927, lxxxviii, 987.

Sixteen cases of fractures of the skull involving the frontal sinus are reviewed. Teachenor divides these cases into two series of eight each. In the first series there were three operations, but they were done after the onset of the complications. In the second series prompt operation was done in each case as a preventive measure. In the first series of eight patients, there were seven deaths. Two died from brain injury accompanying fracture; one of intradural frontal abscess; one of extra-dural abscess and meningitis, and three of meningitis. In one case of cerebrospinal rhinorrhea the patient recovered. In the second series of eight patients, there were three deaths. Two died from brain injury accompanying fracture, and one of meningitis; five recovered without intracranial complications. In the first series the gross mortality was 87.5 per cent; 25 per cent was from brain injury accompanying the fracture of the skull, and 76.5 per cent resulted from intracranial infection; 12.5 per cent recovered. In the second series all the patients had prompt frontal sinus drainage. The gross mortality was 37.5 per cent; 25 per cent was from brain injuries accompanying the fracture of the skull, and 12.5 per cent from intracranial infection. The one death from

meningitis was the result of delayed operation. The death from meningitis twenty-nine hours after injury, and the failure to save the patient by operation thirty-six hours after injury, illustrate the necessity of early diagnosis and operation. In addition to drainage of the sinus, a free exit must be provided for air forced into the sinus from the nasal cavity. In cases of cerebrospinal rhinorrhea or pneumocephalus the dural lacerations should be sought and closed.

MAES, URBAN, New Orleans. Some conclusions on cranial injuries. *South. Med. J.*, March, 1927, xx, 178.

While the immediate recovery of the patient is a serious consideration, the remote consequences of the injury are equally important. The subtemporal decompression devised by Cushing is the most valuable measure in these conditions; it should never be done during the period of shock, and it is wise to supplement it by lumbar puncture or by the use of dehydrating agents. In mild cases lumbar puncture alone may be adequate, but expectant treatment is seldom justified.

OLIVECRONA, HERBERT, Stockholm. On section of the root of the trigeminus at the pons. *Acta Chir. Scandinav.*, Feb. 22, 1927, lxi, 371.

In cases of trigeminal pain due to intracranial or extracranial involvement of the fifth nerve by malignant tumors of the nasopharynx root, section is recommended. The temporal route for section of the root of the fifth nerve should not be used since the tumor may involve the ganglion itself or its neighboring structures. The operation of choice is an intradural approach from a suboccipital craniotomy and section of the root at the side of the pons.

PRICE, JOHN W., JR., Louisville, Ky. Treatment of infections of the face. *Ann. Surg.*, March, 1927, lxxxv, 329.

The treatment of infections of the nose, upper lip and upper part of the face may be outlined according to the degree of the infection.



*The First Stage.* The initial lesion is usually confined to a hair follicle, sebaceous gland or sweat gland. It appears circumscribed and superficial. The skin is red, slightly swollen, edematous, hard and tender for twenty-four hours. During the following day a central point, the size of a pin-head, becomes necrotic and appears yellow beneath the epithelium.

The treatment of this stage consists largely of "don'ts." Don't squeeze; don't pick; don't cut. One should carry a bottle of alcohol in his pocket and apply the alcohol to the infected areas every hour, or a drop of mercurochrome may be applied two or three times a day. After another twenty-four hours the process is definitely localized in most cases. The necrotic area may be opened with safety. Alcohol or mercurochrome may be applied, and resolution occurs.

*The Second Stage.* The second stage, the period of extension, develops when localization fails to occur, or as is usually the case, after the infected area has attracted the patient's attention, and either he or his physician squeezes, picks, or cuts into it. Within twenty-four hours the infection invades the neighboring hair follicles and glands. A carbuncle is developing. A wide area of surrounding tissue is swollen, edematous, infiltrated. Pain is intense. If a lip is involved it becomes two or three times its normal size. The skin is purplish red. About the central necrotic focus, the tissues are very hard and tender. If it has been opened there is almost no discharge. A small gray slough is visible. It is this condition which has led so many physicians into using a knife at once, and on finding no free pus to squeeze the tissues or to probe them. The earlier incision, squeezing and probing not only fails to give relief but causes a further rapid spreading of the infection, and frequently results in a fatal thrombophlebitis of the facial vein, or septicemia.

The patient's powers of resistance should be reinforced by feeding. The local treatment is divided into two stages. During the first few days the one or more necrotic points are kept open, and compresses saturated in 4 per cent salt solution are applied every hour and kept constantly wet day and night by fresh salt solution being added to the gauze with a dropper every fifteen minutes. (The gauze is so small that it tends to dry in this time. Large gauze compresses are to be avoided because their weight interferes with

the superficial circulation and also because large compresses are painful.)

The second stage of the treatment begins when the process has become localized and liquefaction has advanced. Now is the time when small multiple incisions may be made to connect the multiple openings toward the center. Small bits of gauze are inserted to keep the skin edges apart, and to maintain drainage. The compresses are continued as before until healing has occurred.

By this method of delayed operative interference the incisions are confined to the walled-off zone, cutting into veins which are not blocked is avoided, and the chief danger of a carbuncle of the nose, upper lip, or upper part of the face, namely, septicemia or a thrombophlebitis and embolism of the facial vein is lessened.

*The Third Stage.* If the patient is seen for the first time in the third stage of the process, with thrombosis of the cavernous sinus, meningitis or septicemia, the case is, in all probability, hopeless. Nothing will be gained by multiple incisions.

GARRETSON, W. T., and COSGROVE, K. W., Detroit. Ulceration of the cornea due to *Bacillus pyocyaneus*. *J. Am. M. Ass.*, March 5, 1927, lxxxviii, 700.

Sixteen cases originating in the same industrial plant are reported. First aid care and treatment were given, including removal of adherent foreign bodies, foreign body stains and loose foreign bodies from the cornea and conjunctival sac. Irrigation with a 4 per cent boric acid solution and instillation of 10 per cent neosilvol followed removal in each case. A pad was placed over the injured eye for twenty-four hours. The ulcers developed from one to four days following the injury. In this series, three cases did not present an abrasion of the cornea which could be recognized macroscopically. The remaining injuries were not of a penetrating nature. Small particles of emery or debris were adherent to the cornea, which resulted in loss of epithelium. In rabbits infection of the cornea was not possible by inoculation of an abrasion produced experimentally. To obtain similar serious sequelae, the bacteria had to be injected between the layers of the cornea. In an attempt to discover the source of the infection, a careful survey of the positions held by the men was made. Only two were working in the same part of

any building (foundry). Another two men were from the same department. The remaining men were scattered over the plant in widely separated buildings. The only place where all the men had congregated was the first aid hospital. A careful survey made here did not disclose any definite focus. Cultures taken of the boric acid used were negative.

FLYNN, CHARLES W., Dallas. Primary endothelioma of cervical lymph-nodes. *Ann. Surg.* March, 1927, lxxxv, 347.

Primary endothelioma of the cervical lymph-nodes is a more common neoplasm than is generally supposed. The disease is limited to one or a small group of glands, more commonly the superficial cervical lymph-nodes of the anterior triangle than the more inaccessible cervical glands. Biopsy is the only reliable method of diagnosis at this time and even that requires the services of a highly competent pathologist. A suspicious tumor of the neck should always be subjected to biopsic diagnosis early in its development.

If an early diagnosis of primary endothelioma of the cervical lymph-nodes is made and it is determined that it is not the generalized form, an operation immediately and properly performed will probably result in complete cure.

BRENIZER, ADDISON G., Charlotte, N. C. Thyroiditis accompanied by hyperthyroidism. *Ann. Surg.*, March, 1927, lxxxv, 339.

Brenizer reviews the literature on this subject, reports five cases and draws the following conclusions:

1. Thyroiditis is rare, probably  $\frac{1}{2}$  to 1 per cent of all operative material and  $\frac{1}{4}$  to  $\frac{1}{2}$  per cent of all observed clinical cases.

2. The two most frequent proved types of inflammation are tuberculous and woody thyroiditis. Syphilitic thyroiditis certainly occurs. Non-specific thyroiditis has shown its bacterial cause in some suppurating cases.

3. Hyperthyroidism may accompany any type of thyroiditis at any stage; usually the subacute stage. The relation in tuberculous thyroiditis is striking.

4. Most cases of non-specific and woody thyroiditis finally become hypothyroid whether operated on or not. (Difference of opinion as to this point at the Crile and Mayo Clinics.)

5. Cases of tuberculous thyroiditis operated on have given the best functional lasting

results. Syphilitic thyroiditis has been received with appropriate treatment.

6. Therefore the more slowly progressive and destructive type of inflammation is more apt to be accompanied pathologically by hyperplasia and signs of hyperthyroidism and is more apt to give better functional results after operation.

7. The usual amount of thyroid should likely not be removed, even in tuberculous thyroiditis, for at least one case out of thirteen has resulted in myxedema.

McCLURE, ROY D., Detroit. Experiences with the thyroid problem in a Detroit clinic. *Ann. Surg.*, March, 1927, lxxxv, 333.

McClure concludes:

The use of iodine promiscuously in table salt in the effort to prevent simple goiter may be harmful. The use of iodine controlled by regular dosage is of great value in the prevention or treatment of simple colloid goiter. The use of iodine in the preparation of patients with hyperplasia of the thyroid for operation is of great value. The use of iodine in the preparation of patients with toxic adenoma for operation has been of value in McClure's clinic. He advocates the removal of simple adenomas of the thyroid as a potential source of toxic hyperthyroidism, as well as for the fact that an adenoma may be a precancerous lesion. Myocarditis with auricular fibrillation is not a contraindication to operation. Too much concern over mortality statistics may cost the life of an occasional patient who might, with operation, have had his life prolonged.

LAHEY, FRANK H., Boston. Successful operation in eight cases of pulsion diverticula of the esophagus. *Boston M. & S. J.*, March 3, 1927, cxcvi, 341.

The two-stage procedure and local anesthesia render removal of esophageal pulsion diverticula so safe that they should not be permitted either to attain large size or to produce obstructive symptoms before operation is sought. In the eight cases reported here, there was no mortality.

The longitudinal region just in front of the sternocleidomastoid lends itself most satisfactorily to novocaine infiltration, allowing painless exposure of the esophagus, manipulation of which produces practically no discomfort.

Another advantage of local anesthesia is that the patient may be asked to swallow, thus elevating the top of the diverticulum from its deep position and facilitating its dissection.

The most difficult portion of the dissection is the separation of the inner wall of the diverticular sac from the external wall of the esophagus to which it becomes adherent. The separation at the lowest point is not difficult, but as one approaches the neck of the sac, extreme caution is necessary. For, in order to permit thorough mobilization and implantation of the sac, the dissection must be carried completely up to the neck; yet if it is carried too far, the sac will be penetrated at the neck, and leakage result.

It is important to be sure that the sac is not pulled out so far that the esophagus is obstructed; and to insure against this error, find the point on the wall of the diverticulum sac against which the skin rests with the wound open and the esophagus demonstrated as in its midline position, and make certain that the sac is implanted in the wound up to this point.

Should it become necessary, due to obstruction, to consider tube feeding, a large catheter may be passed through the apex of the sac, guided through the neck of the sac, down the esophagus into the stomach, and leakage prevented by a purse-string suture around the tube.

The second stage of the operation (cutting the sac off) may be undertaken any time after nine or ten days, the entire sac being cut away flush with the skin. This may be done almost without pain. Estimate the length of the portion of the sac remaining in the wound and connecting the esophagus with the skin by passing the last finger down the canal until the opening into the esophagus is felt and, measuring the distance on the finger, and under local anesthesia, separate mucosa from submucosa for this distance down to the point where the neck of the diverticulum joins the longitudinal esophagus and cut away the mucosa for this distance. The wound is packed with boric ointment gauze, and feeding continued as before. Closure as a rule takes place in a few days, but in two cases with very large sacs it was not complete until three weeks after operation.

HALSTEAD, ALBERT E., and THURSTON, HERBERT F., Chicago. The treatment of bronchial fistulas. Report of case. *J. Am. M. Ass.*, March 5, 1927, lxxxviii, 689.

In the case reported, the scar tissue lining the cavity in the chest wall and covering the exposed part of the right lung was excised, and by means of purse-string sutures of catgut the openings into the bronchi were closed and inverted. A flap of fat and fascia taken from the patient's thigh was used to fill in the cavity in the lung. A pedunculated flap of skin and muscle was placed over this fascial flap and sutured to the surrounding skin edges with black waxed silk sutures. Tension sutures of heavy black waxed silk were used to pull the skin edges together, covering the space made by the shifting of the skin flap. The fistula remained closed. The most common type of bronchial fistula is said to be the bronchopleural occurring in conjunction with pulmonary tuberculosis with tuberculous empyema. These are generally not amenable to surgical treatment. Bronchopleural fistulas occurring in the course of an empyema (non-tuberculous) generally close spontaneously when the empyema cavity closes. Irrigation of an empyema cavity in the presence of a bronchial fistula should never be practiced. In bronchocutaneous fistulas arising from abscess or gangrene of the lung, operative measures aimed at the closure of the fistula should not be attempted until the abscess cavity has closed or the gangrenous tissue has sloughed and the cavity has become clean. After the simpler non-operative methods, such as cauterization of the tract, have failed to close the fistula, the rational procedure is to (a) clear the fistulous tract from its cutaneous orifice to the bronchus by sharp dissection of its epithelial lining and also the surrounding fibrous tissue; (b) close the opening into the bronchus by a purse-string suture through the peribronchial connective tissue and (c) transplant sufficient fat with fascia to fill the depression in the lungs and cover this transplant by a plastic operation on the chest wall, the transferred flap being made up of skin, fascia and muscle.

GOTTESMAN, J., and ZEMANSKY, A. PHILIP, Jr., New York. Fat necrosis of the breast. A study of twenty cases. *Ann. Surg.*, March, 1927, lxxxv, 438.

Seventy-eight amputated breasts were stud-

ied, and in fourteen of them some stage of fat necrosis was found.

The age incidence in this series ranged from nineteen to sixty years, but the majority of cases occurred in the fourth and fifth decades of life.

Six cases had general obesity and unusually fatty breasts. Two cases are definitely recorded as not obese, and in one case the patient was emaciated.

The breast was the seat of pain in six cases, in four of which the breast tissue showed some other concurrent pathological condition besides that of fat necrosis. The tumor was of stony hardness in twelve of the cases and in one case it fluctuated. Skin fixation was present in five cases, and noted as absent in seven cases. Nipple retraction occurred but once. The lesion varied in size from 1 mm. to 5 cm. in diameter and was not confined to any particular quadrant of the breast.

A positive history of trauma was obtained in only one.

The cases can be divided into four groups: (1) Fat necrosis occurring in subcutaneous tissue overlying but not involving breast. (2) Fat necrosis occurring as a single tumor mass in an otherwise normal breast. (3) Fat necrosis occurring as multiple punctate areas in a breast the seat of some other pathological process. (4) Fat necrosis occurring in a lipoma of the breast.

The authors conclude:

Fat necrosis of the breast is evidence of the response of fatty tissue to an irritant.

Factors other than trauma may explain this phenomenon.

Fat necrosis frequently occurs in association with diffuse inflammatory or cystic disease of the breast.

It is highly suggestive that the escape of fatty material from a dilated duct and its subsequent decomposition plays a rôle in the causation of this process.

BALFOUR, DONALD C., and HENDERSON, EARL F., Rochester, Minn. Benign tumors of the stomach. *Ann. Surg.*, March, 1927, lxxxv, 354.

In the fifty-eight cases of benign tumor of the stomach encountered at operation the tumor was removed in fifty-seven, and exploration only was carried out in one case, that of polyposis involving the whole stomach. Patients with marked anemia were given sufficient

transfusions to raise the percentage of hemoglobin to a satisfactory level and, when necessary, the operation was performed under local anesthesia. Of the thirty-six cases in which the tumor was the only lesion, the tumor was removed by excision along in seventeen, and in the remainder (except in the case of exploration) the segment of the stomach containing the tumor was resected. The situation of the tumor determined the best method of approach. The procedure used most frequently was transgastric excision through an incision in the anterior wall, and division of the pedicle by the cautery. In the larger tumors the possibility of malignant degeneration makes partial gastrectomy advisable; in at least one case carcinoma developed at the site of the attachment of the pedicle.

JUDD, E. STARR, and NAGEL, GUNTHER W., Rochester, Minn. Duodenitis. *Ann. Surg.*, March, 1927, lxxxv, 380.

The term duodenitis has been more or less arbitrarily limited to a type of chronic inflammation of the duodenum without calloused ulcers, the clinical picture of which is practically identical with that of chronic duodenal ulcer. The cause of the disease is unknown. The pathologic findings are distinctive. The association between duodenitis and chronic ulcer of the duodenum is probably close, but the exact relationship of the two lesions is not known. Gastritis and jejunitis are pathological and surgical entities and probably bear the same relationship to gastric ulcer and jejunal ulcer as duodenitis does to duodenal ulcer.

Duodenitis is a surgical and pathologic entity characterized by circumscribed or diffuse inflammation of the first portion of the duodenum without the formation of chronic ulcer. The clinical picture and roentgenological data are almost identical with those of chronic duodenal ulcer. No niche is seen in duodenitis. The association between duodenitis and chronic duodenal ulcer is close. All chronic ulcers probably originate from duodenitis. The reason why duodenitis is not always followed by chronic ulceration has not been determined. Gastritis and jejunitis are surgical and pathological entities, the full significance of which is not known.

OLCH, ISAAC Y., St. Louis. Chronic cholecystitis. An analysis of 100 consecutive cases diagnosed with cholecystography and treated

by cholecystectomy, in which the end results were investigated. *Am. J. M. Sc.*, March, 1927, clxxiii, 368.

One hundred consecutive cases of chronic cholecystitis are reviewed in which the cholecystogram was used in the diagnosis and in which cholecystectomy was done.

Extensively scarred and thickened gall bladders, with or without stones, represent the end stage of a long-standing disease.

These can usually (70 per cent) be diagnosed by careful history and physical examination.

Cholecystography in these cases has been an infallible corroborative laboratory procedure.

Cholecystography is an index of physiological function of the gall bladder and with this in mind cholecystitis can be detected long before marked gross changes have occurred in the gall bladder.

In every case so diagnosed cholecystectomy has resulted in complete relief of symptoms.

Chronic hepatitis is constantly associated with chronic cholecystitis, no matter how slight the latter may be.

BAILEY, HAMILTON, England. The clinical aspects of acute pancreatitis. *Brit. M. J.*, Feb. 26, 1927, i, 367.

An outstanding feature, which helps to differentiate pancreatitis from other acute intra-abdominal inflammations, is the almost complete absence of rigidity of the abdominal wall. This is accounted for by the fact that preoperative general peritonitis is absent.

Cyanosis is a fairly common accompaniment of the most acute forms of this disease; it is most marked in the cervicofacial region. The cyanosis is undoubtedly due to the profundity of the toxemia.

DOTT, NORMAN M., Edinburgh. A simple method of intestinal anastomosis illustrated by three diverse cases of its application to the large intestine. *Edinb. M. J.*, March, 1927, xxxiv, 55.

The successful construction of Eck's experimental venous fistula depended on the method to be described.

The procedure is applicable to lateral and end-to-side unions; it is not available for end-to-end anastomosis. The viscera to be anastomosed are laid together and united as usual by a line of sutures representing the posterior seromuscular layer. The proposed opening in each viscus is then outlined by an incision

which divides the seromuscular layers and lays bare the submucous tissue. The edges of these incisions retract, exposing a strip of intact mucous membrane. The posterior lips of these incisions are now united by sutures, each stitch embracing the cut seromuscular margin and underlying submucous tissue. In this way all blood vessels of any size are included by the stitches, and the mucous membrane is securely anchored to the outer coats along the suture line. The important step in the procedure is now taken. A sufficiently long needle, carrying a length of No. 60 commercial linen thread, is entered through the exposed mucous membrane to the lumen at one end of one of the incisions. The needle is passed along the lumen and brought out at the other end of the incision. The same needle is passed along the lumen of the other viscus in a similar way but in the opposite direction. The two layers of mucous membrane, which will form a septum between the viscera when the anastomosing sutures are completed, are thus encircled by the loop of thread, the free ends of which protrude at one end of the anastomosis. The anterior layers of suture are not inserted. The inner takes the anterior cut edges of the seromuscular layer and the underlying submucous tissue, again controlling all large vessels and fixing the mucous membrane. The outer is a simple inverting seromuscular suture; it is carried to the extremity of the anastomosis from which the linen threads protrude. At this point one stitch is left uncompleted. The linen thread is now used in the manner of the Gigli wire saw and the layers of mucous membrane which it includes are easily and rapidly divided. The continuity of the lumina is thus established. The loop of linen thread comes away as the mucous section is completed. The final stitch is inserted over the point from which the cutting thread escaped, thus completing the operation. The cutting thread should be the rough commercial article, which acts better as a saw than smooth surgical thread; its integrity should be carefully tested before its insertion, since the establishment of the lumen depends upon it.

The procedure is also useful in end-to-side anastomosis of the small to the large intestine. It involves the open exposure of the lumen of the small intestine and the application of a controlling clamp to it. The much more infective lumen of the colon is preserved intact until the anastomosing layers are completed

and it is then opened by the cutting linen loop which has been inserted round it.

OLSSON, YNGVE, and PALLIN, GUSTAF, Kristianstad. The roentgen appearance of acute intussusception. (Über das Bild der akuten Darminvagination bei Röntgenuntersuchung und über Desinvagination mit Hilfe von Kontrastlavements.) *Acta Chir. Scandinav.*, February 22, 1927, lxi, 371.

The authors relate four cases of intestinal intussusception in children where characteristic roentgen pictures were obtained by opaque enemas; a central non-filled area of the intestinal lumen corresponded to the intussusceptum.

In three of the cases reduction was obtained by increasing the pressure of the enema without anesthesia.

LEAS, R. D., Cleveland. Myositis of rectus abdominis muscles contrasted with acute intraabdominal conditions. *Am. J. M. Sc.*, February, 1927, clxxiii, 270.

Myositis of the abdominal muscles assumes considerable importance because of its possible confusion with suspected intra-abdominal disease. Leas reports two typical cases. The diagnosis was based on the following findings:

1. Activation of the rectus muscle was painless.
2. Stretching of the affected muscle caused exquisite pain.
3. Palpation of the relaxed muscle gave little pain, but of the activated muscle a considerable degree of pain.
4. There was no disturbance of sensation over the affected areas.
5. The administration of salicylates gave relief in a very short time.

MOSCHCOWITZ, ELI, New York. Pains of parietal origin simulating visceral disease. *J. Am. M. Ass.*, March 19, 1927, lxxxviii, 897.

Abnormal conditions of the trunk parietes may simulate visceral disease.

Exclusive of gross anatomic changes, these conditions are: arthritis of the costochondral joints; the neuritis of herpes zoster in the pre-exanthematous stage; "slipping" rib; epigastric hernia, and muscular pains. Of these, muscular strains are by far the commonest.

The distinguishing feature of these pains of parietal origin is that they are profoundly influenced by bodily movement and rest.

A differential diagnosis between pains of parietal and of visceral origin is usually possible without the aid of laboratory methods.

The cause of these pains, as a rule, is a strain, either acute or repeated: in many cases, however, it is not easily fathomed.

Visceral lesions often affect adjacent muscles, and one must be on one's guard not to overlook visceral disease.

HUNNER, GUY L., Baltimore. Ureteral stricture: The etiology, diagnosis, pathology and treatment of a new abdominal syndrome. *Am. J. M. Sc.*, February, 1927, clxxiii, 157.

Because of the early diagnosis and surgical treatment of most cases of appendicitis, and because of the neglect of proper diagnosis in most patients suffering with ureteral stricture, Hunner states that today ureteral stricture as a source of incapacity and morbidity ranks equally with or perhaps above appendicitis. Ureteral stricture as treated, or rather, as neglected today, is not only responsible for the physical discomfort and incapacity which it directly causes, but must also be charged with the results of mistaken diagnoses.

Simple inflammatory stricture due to a focal infection in some other part of the body is so overwhelmingly frequent, when compared to stricture from all other causes, that Hunner believes that the disease usually originates from some such focus. The acute infectious diseases of childhood probably leave inflammatory areas in the ureter, the results of which may not be apparent until later in life. Any localized acute or chronic inflammatory process may finally lead to ureteral stricture. Carbuncle, onychia, intestinal, gall bladder, appendix, and bone inflammations probably each account for a certain percentage of stricture cases; but Hunner's experience seems to point to the infections about the head as causing by far the largest number of inflammatory conditions in the ureteral wall. The physician who keeps this disease in mind, when considering any vague abdominal disorder, is surprised at the frequency of its occurrence, and at the ease with which a fairly certain diagnosis is made without the aid of the urologist.

Probably every man with a reasonably large practice has one or more of these patients on his visiting list, patients who for the most part have been consigned to the group of neurasthenics supposedly in the enjoyment of miserable health. Some of these are decorated

with a half dozen laparotomy scars. Others have tried the skill of gastrological confrères and are still complaining of vague abdominal pains, accumulations of gas, or perchance a continued mucous colitis. Others are wearing the orthopedic harness to relieve the back, hip and thigh pains. Some have been sentenced to one or more terms at Saranac, Asheville, or Colorado, in spite of the fact that the most exhaustive clinical methods have failed to reveal signs of tuberculosis, and the patient still complains of a vague indefinite backache located higher than the usual kidney ache, a slight daily rise of temperature, and general malaise and asthenia.

And yet the general practitioner, if he so wills, can learn tomorrow, almost to a certainty, and without the help of a urologist, whether or not one of these trying patients has ureteral stricture as the physical foundation for the so-called neurasthenic condition.

In about 75 per cent of these cases there is a history of bladder trouble. This may be so slight that the patient has not mentioned it, and on the direct question may answer that she has no bladder symptoms, only a slight frequency when she gets nervous or excited, or a frequency at the time of the menstrual period, or in association with a "cold" or sore throat, or with an arthritic attack. There are all grades of bladder distress up to the condition of complete incontinence.

In 20 per cent of stricture patients, there is a chronic pyelitis on one or both sides, and the urine will give characteristic findings. In 50 per cent only a few erythrocytes, a few leucocytes, albumin from a slight trace to a large quantity, or casts, or a combination of these elements will be found. In the remaining 30 per cent of stricture cases, the urinalysis is completely negative. The kidney above a stricture is usually, but not always, tender. Even when the kidney cannot be felt, tenderness in the upper flank will usually be elicited.

Palpation of the ureter where it crosses the pelvic brim practically always elicits tenderness in stricture patients. Frequently the patient will refer discomfort so caused to the epigastrium and complain of nausea, or "that old gas pain"; or the discomfort is referred down the ureter to the "ovaries" or to the bladder with a desire to void.

Palpation of the ureter in the broad ligament region usually distinguishes the area of

greatest tenderness. Dyspareunia in the majority of cases is due to the presence of ureteral stricture, and "ovarian neuralgia" is probably more often a ureteral than an ovarian pain.

The chief interest to the pathologist centers in a study of the renal lesions caused by the presence of ureteral stricture.

The treatment is usually non-surgical and consists in relief of the local symptoms and improvement in the kidney function, by dilatation of the stricture area and restoration of adequate renal drainage. Treatment often fails to give permanent relief until the original focus of infection is eradicated.

McGUIRE, STUART, Richmond. Use of appendix vermiformis in the formation of a urethra in hypospadias. *Ann. Surg.*, March, 1927, lxxxv, 391.

McGuire has three times used an appendix, stripped down to its submucosa, as a graft to form an artificial urethra. It worked well in all three cases although the graft was from other individuals.

LEWIN, PHILIP, Chicago. Disturbances of the metatarsal arch. *J. Am. M. Ass.*, March 26, 1927, lxxxviii, 994.

Lewin stresses the fact that diathermy, negative galvanism and sinusoidal current are helpful adjuvants in the treatment. Plaster of Paris casts are frequently indicated in the treatment of metatarsalgia. Less frequently is operation necessary. The various operations in this region are tenotomy, tenodesis and tendon transplantations, such as the Jones or Sherman operations. Hoffman's operation, consisting of removal of the metatarsal heads, should be reserved for extreme cases, in which it is most valuable. Arthrodesis of the metatarsal joints is rarely indicated. Likewise, arthroplasty can be performed. Hallux rigidus, whether of the flexus or the extensus varieties, may be relieved by the insertion of a thin strip of steel the entire length of the sole of the shoe, in order to prevent movement at the metatarsophalangeal joint. True gout is not seen very often at present, but there is a very definite condition of arthritis and peri-arthritis occurring in the region of the big toe joint that is either caused or aggravated by disturbances of metabolism, especially the metabolism of meat, fish and eggs.



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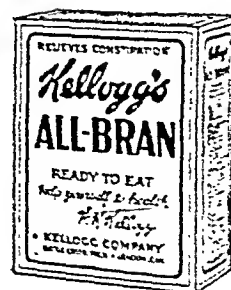
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**F**OUR hundred and sixty years before the Christian Era, Hippocrates the famous Greek physician and surgeon, speaks of changing the steel blades on his bronze handled knife. By this method, he says the blade and handle are separately cleaned and different patterns of blades may be used with the same handle.

Recent excavations in Greece and Pompeii have confirmed the writings of Hippocrates.

The Greek scalpel usually consisted of a bronze handle and steel blade although specimens have been found of gold, silver and iron knives. The handle was slotted at one end to receive the blade and the other end terminated in a spatulate for blunt dissecting purposes. Some handles carried a drill or needle in place of the spatulate.

The blades were made in many shapes and sizes. The similarity between the scalpels of the Ancients and those of our own day would indicate that the Greeks were as well advanced in medicine and surgery as they were in the other arts and sciences of their time.

The Greeks and later the Romans made a very fine steel from a native ore containing 75 per cent of iron. The ore was smelted over a charcoal fire in the open air. The oxygen absorbed the impurities and the carbon from the charcoal united with the iron to produce a high quality of steel.

It has taken 2400 years to develop the modern detachable blade knife. Except for refinement of design and material, the knife of today differs little from its Greek prototype.

However, the detachable blade knife of today has improved in keeping with the modern surgical science in which it is used. Just as the solid one-piece metal scalpel of the late nineteenth and early twentieth centuries was designed to replace

the sceptic and clumsy older knives with their wooden handles, screws, joints, and crevices, which made sterilization and technique difficult, so also the later detachable blade scalpel must not revert to these discredited practices. To this end the Bard-Parker Knife was designed, in which both the handle and blade are each a single solid piece of metal, attachable together without the aid of any clamp or other third part or mechanism, so that the theory of the solid metal knife is preserved. Thus the modern, universally used knife is the equivalent of the solid scalpel, but with the advantage of removable razor edge blades.—*The Bard-Parker Company, Inc.*

**A**T the beginning of the twentieth century practically nothing was known about protein sensitization, as such, though the phenomenon itself had been frequently observed. Its most common manifestation not only before that time, but since, has been in the form of so-called hay-fever or pollinosis; but this disturbance is only a type of constitutional anomaly of a much wider scope, covering, for example, a great variety of food substances, irritating dusts, and animal emanations.

The symptoms of protein sensitization are not specifically indicative of the etiology. Any number of proteins may produce identical symptoms. It becomes necessary, therefore, in any case of hay fever, asthma, urticaria, eczema, gastric disorder or intestinal colic that is not otherwise explicable, to test the patient's susceptibility to one or more of the proteins to which he is exposed.

Protein extracts for this purpose are offered by a number of manufacturers, all embodying, of course, the same principle, but differing in form. Since the tests are

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made by scarifying the skin and applying the extract in small quantity, as in vaccination, it would seem that the best form of protein extract for this use would be a semifluid product, rather than liquid or powder.

This thought has occurred to Parke, Davis & Co., who offer 194 diagnostic protein extracts in glycerin-boric acid paste form, for convenient application. The extracts are obtainable singly and in groups. See the advertisement in this issue entitled "Parke, Davis & Company's Diagnostic Protein Extracts."—*Parke, Davis & Company.*

**P**ARTIAL hand amputations. The loss of a finger may be lamentable, but it cannot be considered a serious impairment. The remaining fingers as a rule are competent to perform all the labors that are usually demanded of the complete hand. Yet there are times when the substitution of a lost finger is essential, either for cosmetic effect or to equip the hand for some special purpose; for example, playing the piano, or other musical instrument.

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Artificial parts of hands, where fingers are clustered, are firm, because, being solid, they permit of the presence of a ductile metal reinforcement. Parts of hands, therefore, are preferably made of rubber.

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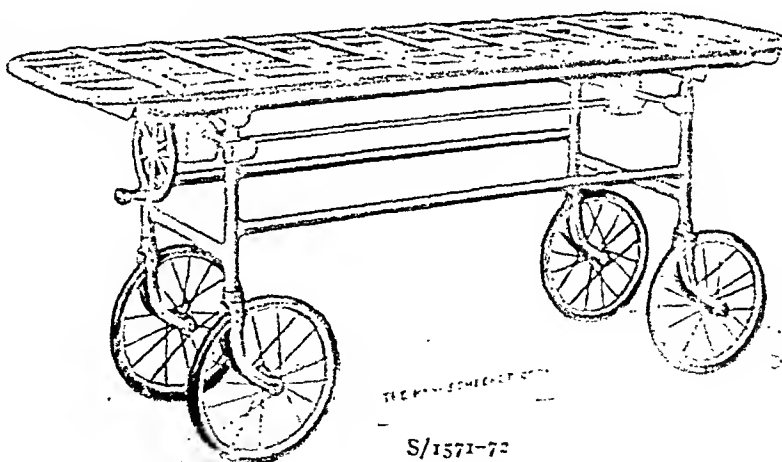
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## OF THE ASSOCIATION AGAINST IMPURE LIQUOR

THE Association Against Impure Liquor is in no way concerned with any movement for or against the repeal of the laws relating to liquor. Its purpose is to secure a membership comprising physicians, hospital authorities, pharmacists and citizens who realize the necessity for purity in liquors administered to the sick.

It is believed that those to whom medicinal liquor is prescribed by competent physicians are entitled to liquor corresponding to the test of the United States Pharmacopoeia and the therapeutic authorities dealing with medicinal liquors.

It is believed that in the interest of public health and the freedom of the reputable physicians of the country, to comply with the terms of the law, there should be an adequate supply of pure medicinal liquor as readily and as certainly available as other medicines; and that the physicians of the country should feel secure from unfair restrictions, and unwarranted criticism, in prescribing and administering liquor whenever, in their professional judgment, such liquor is required.

It is proposed, through this Association, to urge upon all reputable physicians, to secure Federal permits, and be prepared to prescribe and administer medicinal liquor wherever needed, and to this end, to urge all honorable means of securing relief to

the profession from the harassing restrictions now found in the regulations. The effect of these regulations has been to cause many physicians to refrain entirely from securing permits, and prescribing, or administering liquor, lest they endanger their professional standing on account of unwarranted criticism. This Association wishes to aid in protecting reputable physicians, and in adding to the confidence of both physicians and patient.

It is a deplorable fact that the burdens placed upon the pharmacists and physicians in securing and administering pure medicinal liquor have led to the use of illicit, in place of authorized, medicinal liquors. Aside from all other considerations, the notorious impurity of the so-called bootleg liquors makes resort thereto, in cases of sickness, a shocking illustration of the disability of the physicians to secure pure medicinal liquor when prescribing.

The Association Against Impure Liquor is convinced that, regardless of views on the principle of prohibition, the medical and pharmaceutical professions, and the intelligent public, should generally support the purposes for which it is organized. Its objects are fully within the spirit and intent of the national laws and should have the cooperation and support of all good citizens.

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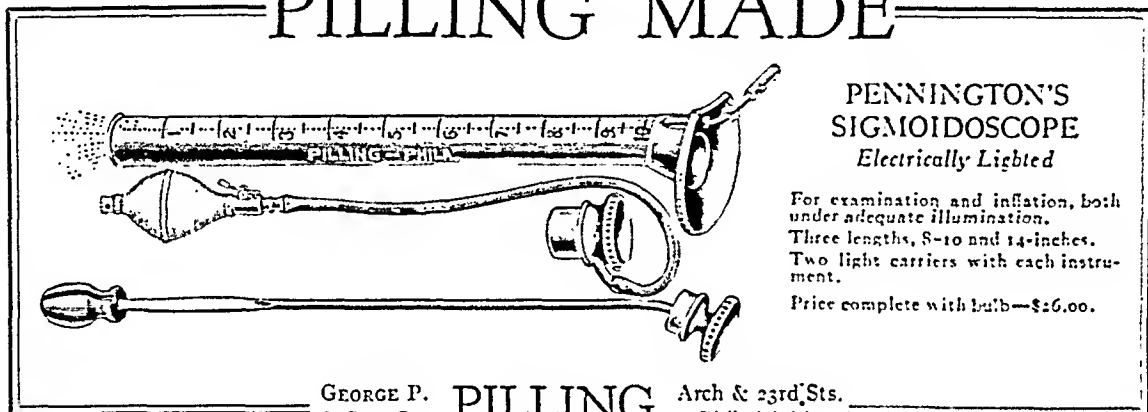
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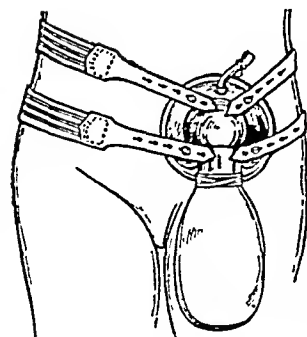
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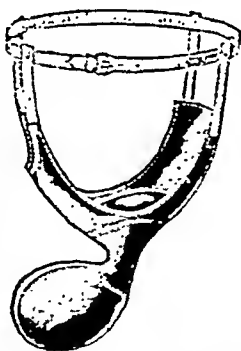
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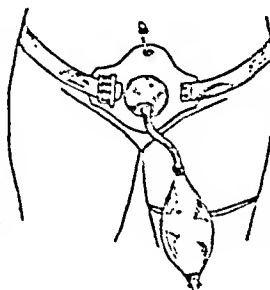
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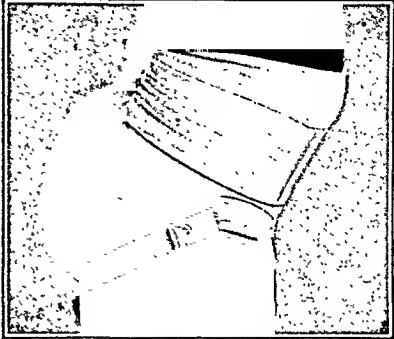
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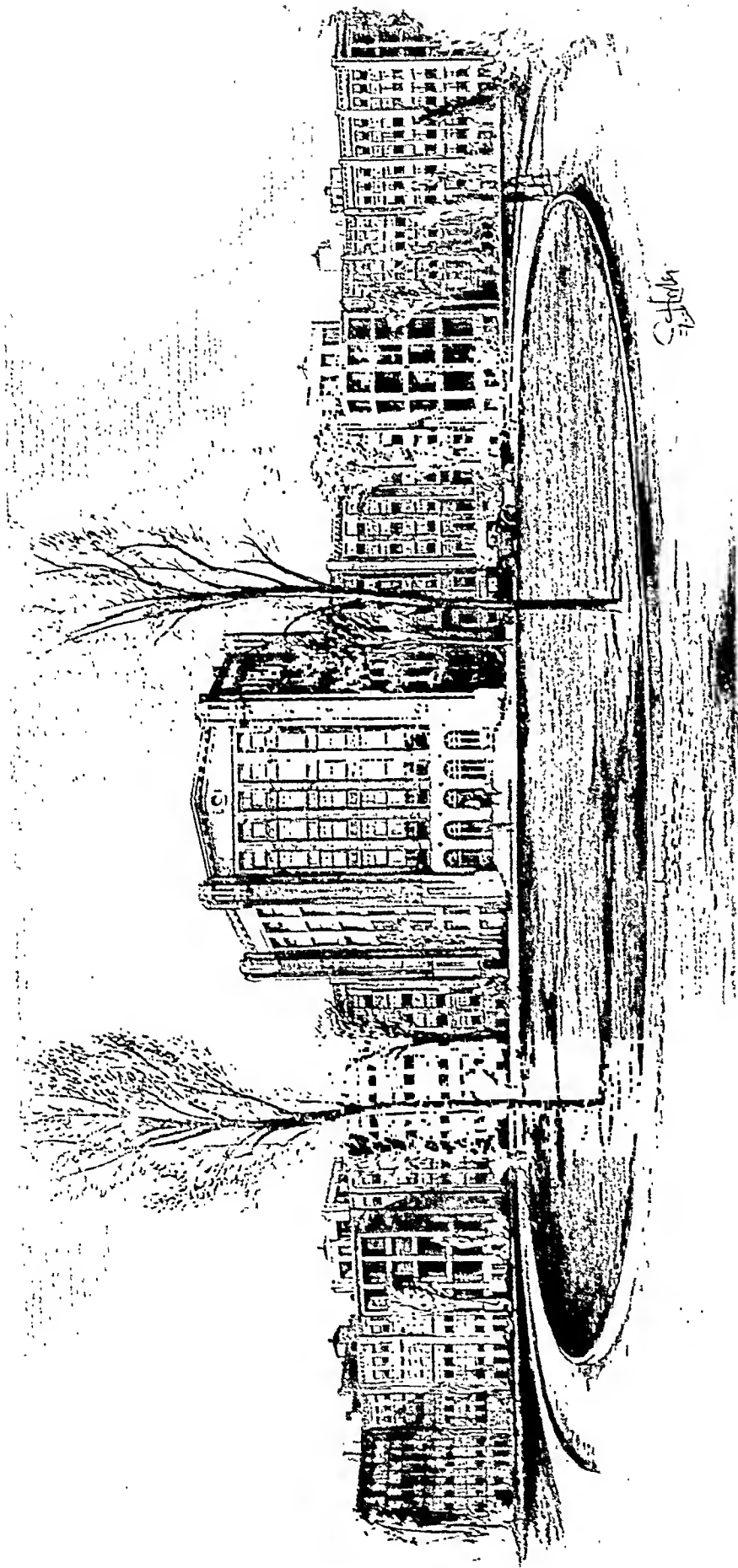
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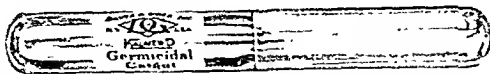


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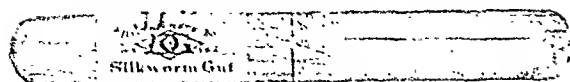
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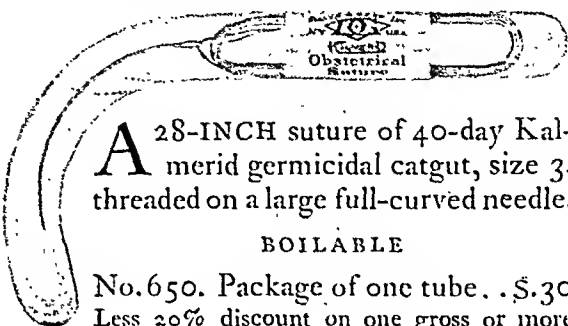
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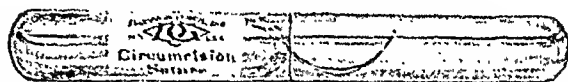


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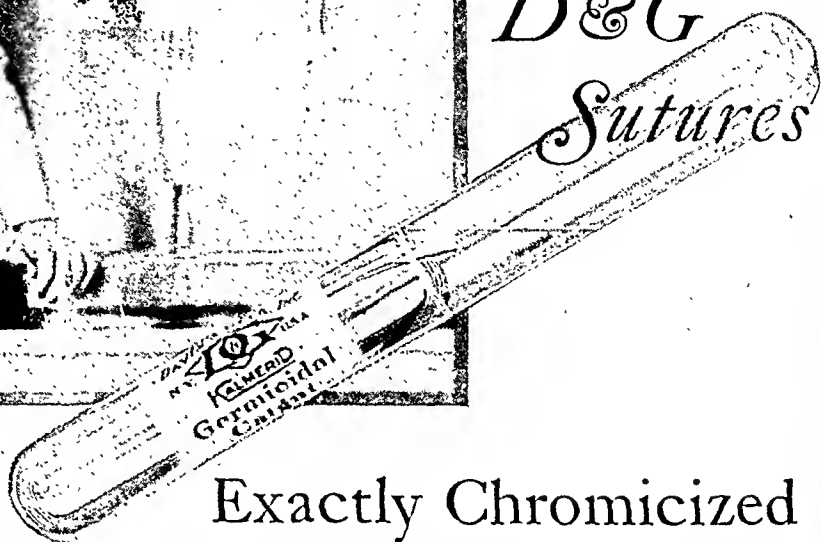
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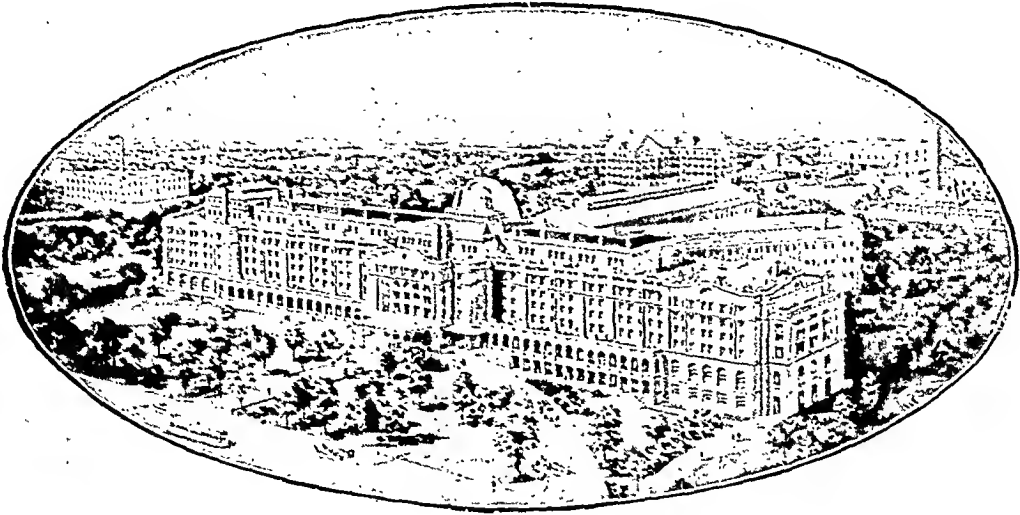
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## *The American Journal of Surgery*

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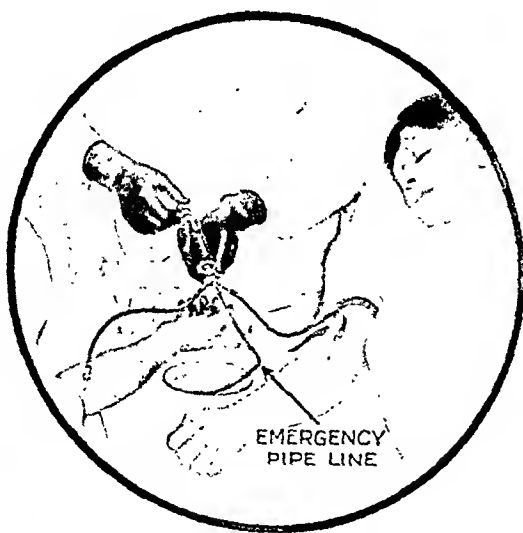
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## THE TREATMENT OF DEEP INFECTIONS OF THE SUBMAXILLARY TRIANGLE\*

RALPH COLP, M.D., F.A.C.S.

NEW YORK

**I**NFECTIONS of the submaxillary region of the neck are quite common. The majority are superficial glandular abscesses and respond readily to incision. When, however, the pathological process involves the deep submaxillary cellular tissues of the floor of the mouth, a grave surgical condition is presented requiring energetic and radical treatment.

The surgery of soft part infections can be productive of good end-results only if the tissue spaces and muscle planes are clearly understood, and no treatment of deep submaxillary disease will be of any avail unless the surgical anatomy of this region is duly appreciated.

### ANATOMY

The base of the submaxillary triangle is the body of the mandible; the apex, the hyoid bone, and the sides, the anterior and the posterior bellies of the digastric muscle. The mylohyoid muscle as it courses from the internal oblique line of the lower jaw to its insertion on the hyoid bone forms not only a partial wall but a sling for the floor of the mouth.

The triangle is enclosed further by the superficial fascia, and the superficial layer of the deep cervical fascia. The latter, covering the forepart of the mylohyoid,

divides at the external border of the anterior belly of the digastric into two leaflets. The superficial portion, strong, firm and rather dense, spans the entire triangle. The deep leaflet, thin and delicate, blends with the perimysium of the rest of the mylohyoid and part of the hyoglossus muscle. The submaxillary compartment is between these two fascial leaves and contains the submaxillary salivary gland, and superficial to it the lymph nodes lying just beneath the fascia.

This "submaxillary space" communicates anteriorly with the "sublingual space" (Fig. 1). Posteriorly it is separated from the "retromandibular space" (Fig. 3 and Fig. 4) by a fascial septum. The latter may be the cause for the localization of retromandibular infections. The sublingual compartment (Fig. 1), which is occupied by the sublingual gland and the deep process of the salivary gland, together with its duct, is floored by the mylohyoid, covered by the alveolar lingual mucous membrane and walled mesially by the tongue, and laterally by the alveolus. The retromandibular space (Figs. 3 and 4) which harbors the lowest part of the parotid gland, the styloid group of muscles, blood vessels and nerves, is bounded anteriorly by the posterior margin of the

\* From the Surgical Service of Dr. A. V. Moschcowitz, Mount Sinai Hospital, New York.



ramus of the mandible, and the pterygoid process; posteriorly, by the mastoid, and the transverse processes of the atlas and axis, and superiorly, by the petrous portion of the temporal bone and the cartilaginous part of the external auditory meatus. The soft parts which upholster this region are, anteriorly, the superior constrictor of the pharynx and the internal pterygoid muscle, inferiorly the sternomastoid and the posterior belly of the digastric, which

Columbia University. The organ itself is enclosed in a capsule adherent anteriorly to the cervical fascia, while its posterior surface is bound by loose areolar tissue but insecurely and loosely to the deep layer of the deep cervical fascia. Most of the gland (Figs. 2 and 3) is situated in the submaxillary triangle, reaching forward to the anterior belly of the digastric, backward to the stylohyoid ligament, which lies between it and the parotid gland.

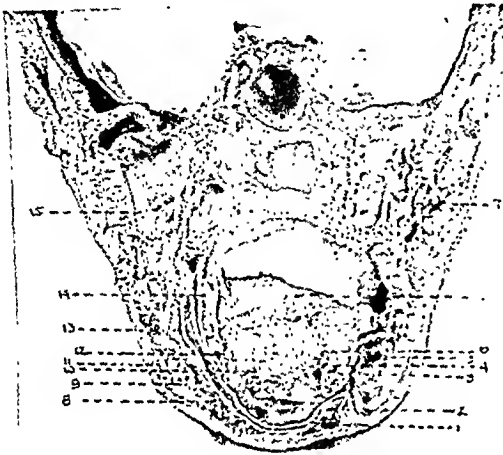


FIG. 1. 1. Mylohyoid muscle; 2. Geniohyoid muscle; 3. Sublingual gland; 4. Lingual artery; 5. Mandible; 6. Lingual nerve; 7. Ramus of mandible; 8. Superficial layer of deep cervical fascia; 9. Lymph node; 10. Nasal artery; 11. Facial artery; 12. Lingual nerve; 13. Mylohyoid muscle; 14. Submaxillary salivary gland (deep process); 15. Ramus of mandible; 16. Dorsum of tongue.

Figures 1, 2, 3, 4 are photographs taken from serial frontal sections cut obliquely through a frozen human head demonstrating the sublingual, submaxillary and retromandibular spaces. Figure 1 is the posterior view of a section, Figure 2, the anterior view of the second section, and Figures 3 and 4, the anterior and posterior views of the same section.

separates it from the superior carotid triangle.

That the submaxillary salivary gland (Figs. 1 to 4) bears important surgical relationships to these three spaces was evidenced by dissections in a series of twenty-five cadavers studied in the anatomical laboratory of the Dental Department of the College of Physicians and Surgeons



FIG. 2. 1. Superficial layer of deep cervical fascia; 2. Digastric muscle; 3. Mylohyoid muscle; 4. Deep lingual artery; 5. Submaxillary salivary gland; 6. Facial artery; 7. Genioglossus muscle; 8. Submaxillary salivary gland (deep process); 9. Buccal mucous membrane; 10. Internal pterygoid muscle; 11. Ramus of mandible; 12. Superficial temporal artery; 13. Geniohyoid muscle; 14. Submaxillary salivary gland; 15. Deep lingual artery; 16. Mandible; 17. Masseter muscle; 18. Ramus of mandible; 19. Internal pterygoid muscle.

superiorly hiding under the body of the mandible, and inferiorly overlapping the central tendon of the digastric and the insertion of the stylohyoid muscles. From its deep surface, a tongue-like process may project forward and inward above the mylohyoid muscle into the sublingual space (Fig. 1). The deep surface of the gland from before backward is in relationship with the mylohyoid, the hyoglossus, the superior constrictor of the pharynx, the styloglossus, the stylohyoid and the posterior belly of the digas-

tricus. The facial artery is either in the substance of the gland or lies posterior to it, and enters the interfascial space on the inner side of the digastric muscle. The posterior facial vein courses to the outer side of the muscle and lies imprisoned in the superficial cervical fascia.

#### SUPERFICIAL INFECTIONS

From this anatomical description it is quite evident that infections of this region

below and parallel to the mandible carried down through the superficial layer of the deep cervical fascia usually evacuates the pus. The infection invariably subsides in a few days following adequate drainage aided by wet dressings or dry heat.

#### DEEP INFECTIONS

Suppuration deep to the submaxillary salivary gland requires more diagnostic acumen and keener surgical judgment.

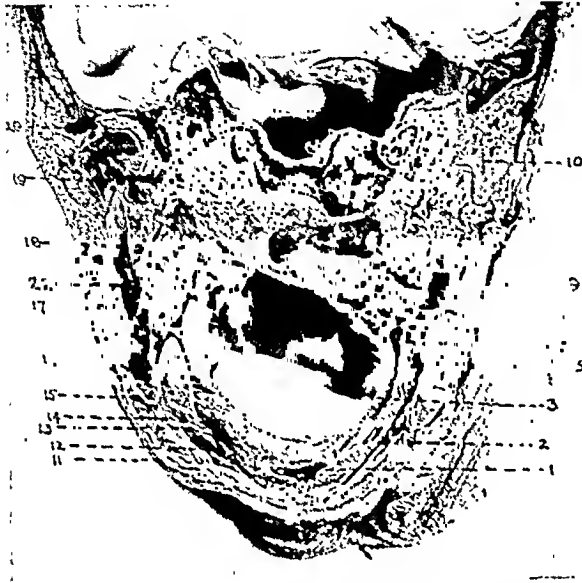


FIG. 3. 1. Hyoid bone; 2. Facial artery and vein; 3. Pharyngeal wall; 4. Facial vein; 5. Jugular vein; 6. Submaxillary salivary gland; 7. External carotid artery; 8. Internal carotid artery; 9. Internal jugular vein; 10. Mastoid process; 11. Superficial layer of deep cervical fascia; 12. Digastric muscle; 13. Lingual artery; 14. Submaxillary salivary gland; 15. Facial artery; 16. Pharyngeal wall; 17. Ramus of jaw; 18. Internal pterygoid muscle; 19. Superficial temporal artery; 20. Temporo-mandibular joint; 21. Pharyngeal wall; 22. Tonsil.

may be divided into those which are superficial, and those which are deep to or actually in the substance of the submaxillary salivary gland. The superficial infections, which are the most common, usually arise in the submaxillary group of lymph nodes and form simple abscesses. These appear, as a rule, as subcutaneous, fluctuating swellings in the submaxillary region, the overlying skin of which is red, hot and tender. The floor of the mouth appears normal and the tongue moves freely. The treatment is simple. A horizontal incision

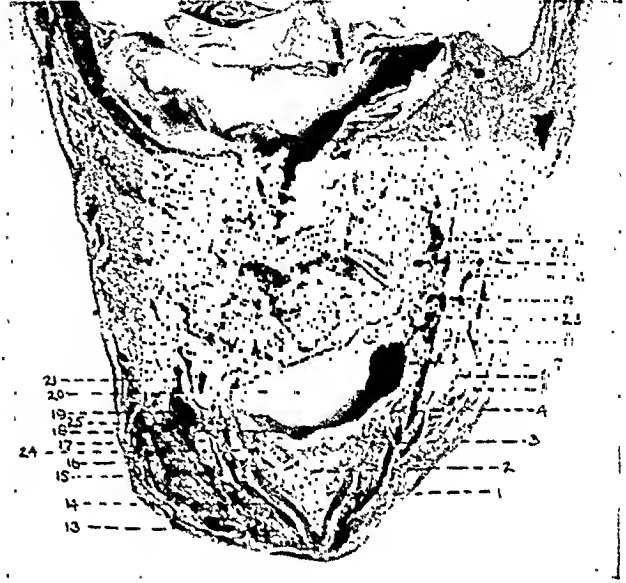


FIG. 4. 1. Thyroid cartilage; 2. Fat pad; 3. Hyoid bone; 4. Lingual artery; 5. Superficial layer of deep cervical fascia; 6. Submaxillary salivary gland; 7. Pharyngeal wall; 8. Facial artery; 9. External carotid artery; 10. Posterior belly of digastric muscle and stylohyoid muscle; 11. Internal carotid artery; 12. Internal jugular vein; 13. Sternohyoid muscle; 14. Thyrohyoid muscle; 15. Common facial vein; 16. Sternomastoid muscle; 17. Lymph gland; 18. Posterior part of base of tongue; 19. Internal jugular vein; 20. Pharynx; 21. Bifurcation of common carotid into internal and external carotid arteries; 22. Middle temporal artery; 23. Temporo-maxillary vein; 24. Facial vein; 25. Pharyngeal branches of the ascending pharyngeal artery.

These patients are extremely ill and present an entirely different clinical picture. There are certain common physical findings by which these deep infections may be recognized. The swelling of the submaxillary region is pronounced and definite but the overlying skin, while edematous and brawny, is rarely reddened. The tumor feels stony hard and fluctuation is rarely to be elicited, because the salivary

gland with its closely adherent superficial leaflet of the deep cervical fascia is a dense, hard, unyielding barrier. This is further attested by the fact that in seventeen cases which ruptured spontaneously, sixteen discharged into the pharynx in the region of the tonsil (Fig. 3). The mouth can be partially opened with great difficulty. The tongue is elevated, protruded and fixed, painful on forced movement, and the mucous membrane of the floor of the mouth is brawny, indurated, edematous and tender.

The actual "space" involved is diagnosed mainly upon the point of maximum tenderness, and the area of greatest swelling. If the sublingual space alone is involved, the tumor and tenderness are greatest in the submental region and there is pain on pressure to the side of the lingual frenum. When the retromandibular space is infected the face is apt to be congested and cyanotic from pressure on the great vessels (Figs. 3 and 4), deglutition is almost impossible because of pressure on the lateral pharyngeal wall, dyspnea is present because of an edema of the glottis, and trismus is extreme. However, it should be borne in mind that since these deep infections resemble a cellulitis their spread along the loose connective tissues of the floor of the mouth is so rapid that invariably the sublingual, submaxillary and retromandibular spaces appear simultaneously involved. Besides, in about 50 per cent of the cases, the salivary gland itself shares in the process.

There is no doubt that a certain number of these deep infections will subside spontaneously or possibly localize, but too much time should not be lost in the application of external heat in the form of wet dressings or poultices, and internal heat by buccal irrigations of hot normal saline solution. If the condition of the patient is not materially improved within twenty-four hours, surgery should be resorted to.

The fact that these infections are deep has led to buccal incisions. Incision of the alveolar lingual sulcus will probably give more direct drainage, even though uphill,

than one through the neck, but it is rather difficult to secure adequate exposure, and buccal drainage is applicable when the sublingual space is solely involved. This, as is well known, is rarely the case. For all practical purposes, a neck incision is preferable. There are two recognized methods of surgical approach, one empirical, the other anatomical. The empirical method consists of a median incision extending from the under surface of the chin to the hyoid bone. This is employed quite commonly, and may be partially accountable for the published mortality of 40 per cent and over in these cases. It bisects the muscles of the floor of the mouth and tongue, namely the mylohyoid raphe, the geniohyoid and the geniohyoglossus, but since the infection is only rarely in these muscles, and is usually in the areolar tissues of the submaxillary triangle, very little is accomplished.

The incision of choice seems to be the lateral one. But in deep infections, especially those of the sublingual space, the lateral incision parallel to the mandible must do more than divide the deep cervical fascia of the neck. It must divide the mylohyoid muscle from its free lateral border to the median raphe, cutting, if necessary, the anterior belly of the digastric muscle near its mandibular attachment. This incision affords free drainage of the sublingual space with very little danger of injuring the ranine vessels, Wharton's duct or the sublingual glands. If the infection has already spread to the submaxillary space and beyond, this incision must be prolonged. A curved horizontal incision may be employed similar to the one used for excision of the submaxillary salivary gland. The tense bulging cervical fascia is divided and rubber dam drains are inserted deep to the submaxillary gland.

However, this at best is unsatisfactory. These patients suffer not only from the toxemia of the infection but, what is more important, from the disastrous effects of the mechanical pressure of an edematous

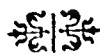
submaxillary salivary gland against the lateral pharyngeal wall and indirectly against the larynx. Simple division of the fascia does not relieve this, and it still leaves the gland blocking drainage. Extirpation of the submaxillary salivary gland is the only logical surgical procedure in these deep infections. At first thought, this may be deemed entirely too radical, too dangerous, and even unnecessary. In actual practice, however, this is not the case, for the clinical improvement noticed following this procedure is immediate and marked. Dyspnea invariably disappears, drainage is more free and the patient feels distinctly better. Naturally, in the late cases where thrombosis and muscular gangrene have occurred and edema of the glottis is present, this operative procedure can be of little avail, it being preferable to perform a tracheotomy simply as a palliative procedure.

It is obvious that local anesthesia is a *sine qua non* in all these operative procedures. In spite of the edema of the tissues, after the fascia has been divided, the gland is easily recognized and may be extirpated without difficulty by working bluntly from the hyoid bone upward, carefully watching for the facial vein, which is super-

ficial and the facial artery which is deep or in the gland. Precaution should also be taken to avoid the lingual vessels which lie rather superficially, being covered only by a few fibers of the hyoglossus muscle. The wound is drained liberally with rubber dam and packing. Following the operation, these wounds have a tendency to slough and secondary hemorrhages may occur from either the facial or the lingual vessels. This, however, is readily controlled.

Occasionally, the retromandibular space has been involved alone. Its clinical diagnosis has already been summarized. There is no reason to remove the gland in this instance. It may be effectively drained by making a skin incision, slightly curved, a finger's breadth below and behind the angle of the jaw; and, after the fascia has been divided, an artery forceps, bluntly introduced upward into the space and kept anterior to the sternomastoid and the sheath of the vessels, invariably opens the pus pocket.

The procedures outlined have been found quite successful in many cases, and even in those rarer unfortunate cases in which the deep infection has been bilateral, an uneventful clinical course followed the removal of both submaxillary salivary glands.



# FASCIAL STRIP TRANSPLANTS IN THE TREATMENT OF HERNIA

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NEARLY forty years ago Halsted in the United States and Bassini in Italy each described a method for the operative treatment of inguinal hernia, in which the transplantation of the cord and the suture of the internal oblique muscle to Poupart's ligament were the novel features. Since that time their technique has been modified more or less by many surgeons to meet individual conditions, but the principles underlying the operation remain the same.

The very great improvement in the results of operation for hernia which followed the general adoption of the Bassini or Halsted method led to a feeling of security and complacency from which we have been aroused by the experience of Workmen's Compensation Commissions, the Veterans Bureau and more careful follow-up systems by the civil hospitals.

## ANALYSIS OF RECURRENCES

The proportion of recurrences after operation for inguinal and femoral hernias varies within fairly narrow limits in different groups of statistics. The age and sex of the patients and the variety of the hernias are the important factors in the study of these statistics. Inguinal hernia operated upon in childhood is almost always cured by any operation that provides for high closure of the sac. Direct hernia is more likely to recur than indirect hernia in the proportion of three or four to one. From 7.5 per cent to 10 per cent of recurrences for indirect inguinal hernia in male adults is a fair average of the results in several large series of cases.

Most often the recurrence shows itself a few weeks after the operation, sometimes it is delayed for a year or more. In Erd-

man's series about one-half of all the recurrences took place within the first six months.<sup>1</sup> The recurrence is most frequently found in the lower portion of the canal, at or near this inner angle of the wound.

**CAUSES OF RECURRENCE.** When the recurrent cases are analyzed, the causes of failure to cure the hernia fall into two groups: those due to accidents or omissions in the course of the operation or to interference with the process of healing, and those attributable to some anatomical peculiarity of the patient.

Infection of the wound is almost certain to be followed by a recurrence. A suture, especially one of the deep stitches, placed under great tension will devitalize the tissues within its bite and leave a weak spot for later protrusion.

Evidence of incomplete removal of the sac and of failure to make a proper suture of the muscles and fascia, are often observed when operating for recurrent hernia. Poor judgment in selecting patients for operation, and especially a failure to use proper methods of pre-operative treatment with patients who require such preliminary management, explain certain recurrences.<sup>2</sup>

The anatomical peculiarities center around defects in the muscles and fascia of the abdominal wall. Deposits of fat in and between the layers of the wall and surrounding the blood-vessels which perforate the fascia; wide internal opening of the sac, large hernias of long duration, and direct inguinal hernias present difficulties because of their effect on the muscles and fascia.

Recurrent hernias, especially those following suppuration and the inguinal hernias secondary to damage of the lower abdomi-

nal nerves make a good proportion of the failures.

rectus muscle. In some patients the tendon is well developed but greatly relaxed.



FIG. 1. Skin incision. The thumb is over the spine of the pubis and the index finger over the anterior superior spine of the ilium.

Massive hernias whose contents when replaced will add to the intra-abdominal tension require a period of pre-operative treatment to insure cure.

The most important anatomical peculiarity is a deficiency or absence of the conjoined tendon. In his monograph on hernia published in 1899, Bloodgood<sup>3</sup> showed the importance of this defect.

The defect is recognized by the following method of examination: The patient lies on his back and the hernia, which is not necessarily a large one, is reduced. Invaginating the scrotum the finger is passed into the external ring. With a firm conjoined tendon, the finger meets an obstruction at this point and is deflected outward and upward along the canal. When this tendon is defective there is no resistance and the finger goes directly down through the abdominal wall into the peritoneal cavity. Occasionally the opening is so large that after its introduction the finger can be flexed and touch the region of the symphysis pubis. Such a condition on both sides will allow the fingers to meet behind the

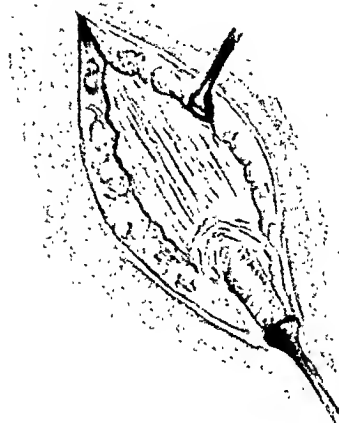


FIG. 2. Subcutaneous tissues retracted to expose aponeurosis of the external oblique and external ring.

Under such circumstances the resistance to the invaginating finger is slight, but with the finger in the ring if the patient lifts

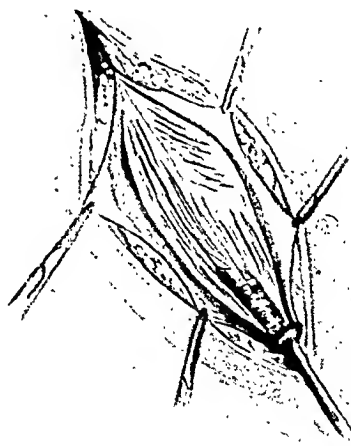


FIG. 3. Aponeurosis divided and flaps dissected inward and outward to expose the shelving portion of Poupart's ligament, the cord, the internal oblique muscle to the semilunar line, and the conjoined tendon.

his head from the examining table, the tendon is felt to tighten as the muscle contracts.

The cure of inguinal hernia therefore appears to depend on careful attention to details in performing the operation, aseptic wound healing, and as far as possible, correction of certain anatomical defects.

#### TECHNIQUE OF OPERATION

Following is a short review of the method of performing the operation and of the expedients which in my hands have proved valuable to overcome the defects.

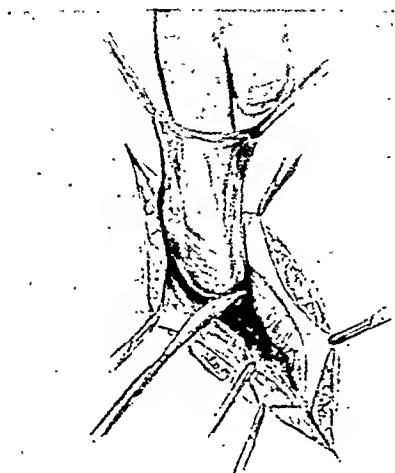


FIG. 4. The sac opened and a finger introduced to facilitate dissection from the cord.

To make the skin incision, the thumb and index finger are extended and placed one over the anterior superior spine of the ilium and the other over the spine of the pubis. The incision begins about an inch inside the upper point and extends to the pubic spine. This incision divides the skin and subcutaneous tissue down to the aponeurosis of the external oblique. The fat and areolar tissue are then dissected away from the aponeurosis to uncover Poupart's ligament, the external ring with its pillars and the intercolumnar fibers. Several vessels are clamped in the course of the incision and dissection.

The aponeurosis is then split in the direction of its fibers from the external ring to well above the internal ring. The ilio-

inguinal and iliohypogastric nerves are noted and avoided in making the incision. The aponeurosis is now dissected back to form two flaps and uncover the shelving portion of Poupart's ligament on the outer side, and the internal oblique muscle, the conjoint tendon and the sheath of the rectus on the inner side. The canal is now entirely open. The cremaster muscle and fascia are divided longitudinally and the sac of the hernia is identified and opened.



FIG. 5. The sac drawn out, split open and transfixed at its neck.

With a finger inside it, the sac is then dissected away from the cord and the cremaster fibers below and from the transversalis or endoabdominal fascia above and around its internal opening. The contents of the sac are dealt with as occasion demands. The isolated sac is drawn out from the separated deep fascia, incised far enough to give a good view of the internal opening, and then the peritoneal cavity is closed by a purse-string suture or a transfixion ligature, or by a combination of both, leaving the ends of the suture long. The sac is then excised and the long ends of the transfixion suture are threaded into large needles. The needles are passed from within outward through the endoabdominal fascia to the outer surface of the



internal oblique muscle above the internal ring. When tied, these sutures draw the stump of the sac well up under the muscles, and invert the direction of any conical dimple that may be present on its inner surface.

The cord is separated as far as possible from the cremaster muscle and fascia and lifted out of the canal. The conjoined tendon and the internal oblique muscle with the underlying fascia are then sewed to

avoid injury to the ilioinguinal nerve in the course of the dissection and in suturing the canal. During the dissection the bleeding points are clamped and all the vessels are ligated with fine catgut before the canal is closed. The skin is closed by any suitable means. Lately we have used a Codman's continuous interrupted suture of equisetine.

The success of this type of operation depends on aseptic healing of the wound



FIG. 6. The stump of the sac after transfixion. The ends of the suture drawn through from below to the surface of the internal oblique.

the shelving portion of Poupart's ligament under the cord by means of interrupted mattress-sutures of kangaroo tendon or chromicized catgut. Four or five sutures are required, one of which is above the cord at its exit through the internal ring. The suture at the inner angle goes through the conjoined tendon, picks up such cremaster fibers as are available and then goes through Poupart's ligament, close to the pubis. Returning it passes through the same structures to be tied on the outer surface of the tendon. In a similar way the other sutures pass through the internal oblique muscle and the deep fascia, utilizing the cremaster fibers present.

The cord is now dropped back on this new floor of the canal and the aponeurosis closed over it with imbrication sutures of catgut. Especial care must be taken to



FIG. 7. The conjoined tendon and internal oblique sutured to the shelving portion of Poupart's ligament, under the cord. The cremaster muscle is included in the sutures. One suture above the internal ring.

which must be free from any great degree of tension.

Where it seems impossible to bring the conjoined tendon over to Poupart's ligament without great tension, and in those cases where this tendon is weak or deficient, one of the following expedients is used. All of these expedients apply to the closure of the deep layers of the canal. The sac is disposed of in the manner already described and the cord is lifted out of the way. The cremaster, if available, is included in the sutures. The aponeurosis is closed over the cord, and the skin is closed as already outlined.

#### TRANSPLANTATION OF A FLAP OF THE SHEATH OF THE RECTUS

This method was originated by Halsted.<sup>4</sup> A triangular flap is cut from the anterior

surface of the rectus sheath, and turned on its outer border. The cut edge is sutured under the cord to Poupart's ligament, beginning at its pubic attachment. In this way the gap in the floor of the canal is bridged by strong fascia. Unfortunately a strong rectus sheath is not always available. Deposits of fat, scarring from previous operations and other factors may prevent its utilization in cases where it seems most needed.

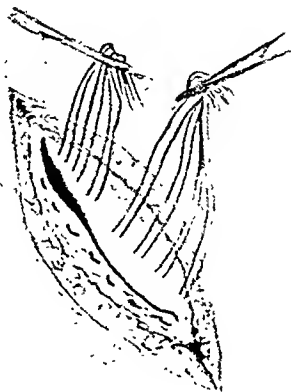


FIG. 8. The inner flap of the aponeurosis sutured with mattress-sutures to overlap the outer flap. The cord is under the layer of tissue.

#### FASCIAL SUTURES

L. L. McArthur<sup>5</sup> advocated the use of autoplasmic sutures in hernia. He obtained his sutures by cutting narrow strips from the external oblique aponeurosis, leaving the pubic attachment undisturbed. At the same time McArthur showed that the fascial sutures remained as living structures in experimental animals and in one human case where he was able to excise the hernial region post mortem more than a year after the operation.

The McArthur strips of fascia are from one-eighth to one-fourth of an inch wide and cut the length of the aponeurosis from the termination of the fleshy muscle to the pubic attachment. Exposure of this expanse of aponeurosis requires a skin incision

longer and slightly more oblique than the ordinary one for inguinal hernia. Each fascial strip is threaded on a strong needle. The inner strip is anchored through the conjoined tendon or the rectus and then carried through the inner end of Poupart's ligament and the periosteum of the spine of the pubis. The outer strip is passed through the loop of the inner one, locking the stitch, and then goes through firm tissue on the inner side of the canal. The

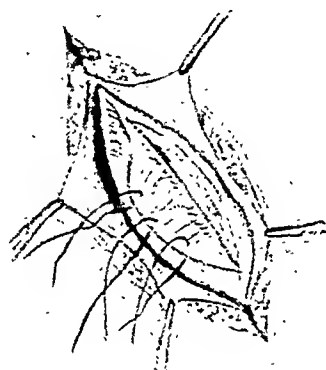


FIG. 9. Flap from the sheath of the rectus turned outward to bridge a gap produced by deficiency of conjoined tendon (*after Halsted*).

fascial strips are carried across the gap, taking firm hold on both sides and are woven back and forth like basket work to fill in the defect.

Between November, 1924, and January, 1926, we used the McArthur method of fascial transplantation in 27 cases. In two of these an undescended testicle complicated the hernia. All of the patients are well and free from recurrence a year or more after operation.

The method possesses the great advantage of avoiding the necessity for an additional incision. Its disadvantages are the limited supply of fascia available from the aponeurosis and the fact that where it is most needed the external oblique often is so thin or so scarred that a satisfactory strip cannot be obtained.

## FASCIAL TRANSPLANTS

Gallie<sup>6</sup> and his associates showed that strips of fascia lata when transplanted as sutures formed rounded cords as they passed through the needle hole, and that these cords soon became surrounded with a delicate vascular membrane, such as is normally found on the surface of the fascia. Further, the transplanted cords of fascia were found living when recovered at intervals of from one week up to two years. The

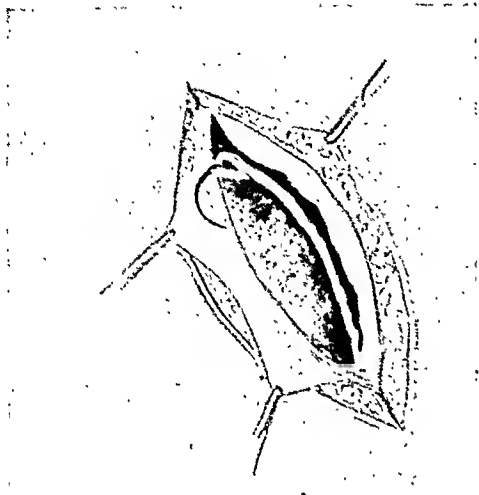


FIG. 10. Fascial strip cut from aponeurosis of external oblique (after McArthur).

tensile strength of the transplants remained constant and they neither stretched nor contracted in their new situation. We have repeated Gallie's experiments to show the life of the transplanted fascial sutures and tendon-like growth in the tissues.

To obtain the sutures a long incision is made on the outer side of the thigh a little behind its middle line. All fat and areolar tissue is cleaned from the surface of the fascia and then a longitudinal incision is made of the length required for the suture. A second incision is made through the fascia parallel with the first and about one-fourth of an inch from it. One end of the suture thus prepared is cut free, threaded into a large-eyed needle and secured by transfixion with catgut. Each suture is about 8 inches long. Before it is detached the end of the suture is ligated with catgut to prevent fraying.

The needle is passed through the conjoined tendon or the rectus sheath so that the suture will have a firm hold in the tissues. The needle then perforates the end of the fascial strip just proximal to the catgut ligature and makes a long loop which is pulled down tight to anchor the suture into the tendon or sheath of the rectus. The needle then goes through the inner end of Poupart's ligament and the periosteum of the spine of the pubes. This



FIG. 11. Fascial strip cut from fascia lata of thigh (after Gallie).

stitch is drawn taut and the suture continued back and forth to draw the internal oblique and its fascia down to Poupart's ligament, locking the suture at intervals by passing the needle through the fascia of a previous stitch. At the position of the internal ring, a lock stitch is taken, the suture is continued to the outer side of the cord and two or more stitches are taken to give additional support in this region. When the defect is a large one, and when the musculature is poor, a second layer of fascial sutures is used. The second suture starts above and ends at the pubis. (To join the strips of fascia, the needle of the first suture is passed through the end of the second and the terminal portion of this suture is drawn down over the first. The needle of the second strip is then passed through the first strip close to its insertion into the

first needle. The first needle is then cut free and the loop drawn down tight.)

With this suture no attempt is made to bring the internal oblique and rectus sheath down to Poupart's ligament. Instead the fascial strips are so interwoven across the gap, and with those of the first row, that a basket-work mat of fascia closes the defect. The end of the last fascial suture is fixed by catching it in a mattress-suture of catgut passing through the rectus sheath or aponeurosis.

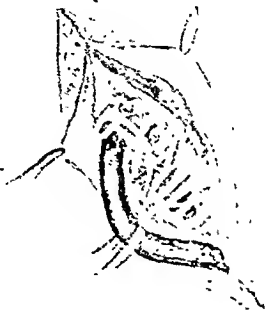


FIG. 12. Basket-work woven from fascial strips to fill in deficiency of structures of floor of canal (after Gallie).

These free transplants of strips from the fascia lata enable us to replace tissues which have been lost by infection or other forms of destruction, and to supply a substitute for anatomical defects in the supporting tissue of the abdominal wall. The supply of strong strips from the fascia lata is adequate for a large defect. This band of fascia is always well developed, is unusually strong and no disability results from the removal of the strips.

I have used the fascia lata transplants in 20 difficult cases of inguinal hernia, 6

recurrent, 4 direct and 10 large hernias with defects of the conjoined tendon or portions of the musculature. I have also used these transplants in 1 large recurrent femoral hernia, 2 umbilical hernias, 1 post-operative epigastric and in 2 postoperative ventral hernias. Failure occurred in one of the ventral hernias where the recurrence was evident at the time the patient left the hospital three weeks after operation. In one inguinal hernia the indirect sac which was present with a large direct one was overlooked and caused a new hernia four months later. In all the other cases the results have been uniformly satisfactory both in the immediate and in the late results. Our first operation using this method was performed in November, 1924, the last one of this series in January, 1926.

Transplanted strips of fascia furnish material by means of which we are able to operate with excellent prospects of cure on that group of hernias in which the conjoined tendon is deficient or absent, or in which other anatomical defects weaken the muscles and fascia of the abdominal wall, a group in which other forms of operating have failed in from 30 per cent to 50 per cent of the cases.

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# ENDOMETRIOMA OF THE ABDOMINAL WALL

## A GENERAL SURVEY AND CASE REPORT\*

URBAN MAES, M.D., F.A.C.S.

NEW ORLEANS

THE subject of transplanted endometrial tissue has been occupying the attention of gynecologists considerably since Sampson's paper in 1921 on the origin of chocolate cysts of the ovary, but to a great extent it has been ignored by the general surgeon, on the ground that it did not particularly concern him. I must admit that this was my own view of the matter until the microscopic findings in a case of painful abdominal scar, upon which I operated some months ago, convinced me that had I possessed more information upon the subject at the time, a correct diagnosis might have been arrived at before operation. Since then, although I have taken the pains to acquaint myself rather fully with the various manifestations of this condition, I have been surprised to find how widespread is the ignorance of it among men who are not gynecologists; as a matter of fact, in at least one instance a surgeon of acknowledged eminence in the profession had literally never heard of this type of new growth.

I can add nothing original to the subject of endometriosis, but since the literature is so voluminous, it has occurred to me that a synopsis of the available facts might be of value, and I desire also, since the number of cases of endometrioma of the abdominal scar is still small, to put my personal case on record, even though the history is regrettably lacking in many details.

The study of endometriomas covers a period of some thirty years, the earliest identification of this type of growth in its intrauterine manifestation having been

made by Cullen in 1895. While the subject was later studied from various angles, particularly by Continental authorities, nothing conclusive was added to it until the epochal work of Sampson in 1921 on chocolate cysts of the ovary, and his more recent work on the identification of this misplaced endometrial tissue in various other parts of the pelvic and extrapelvic organs.

To date, as Gardner<sup>2</sup> has pointed out in his admirable review, ectopic endometrial tissue has been identified in thirteen different locations, namely, the body of the uterus (diffuse adenomyoma); the rectovaginal septum; the Fallopian tube; the ovary (either on the surface or within the substance); the round ligament (both intraperitoneal and inguinal portions); the utero-ovarian, uterosacral and infundibulopelvic ligaments; the sigmoid flexure of the colon; the small intestine; the vermiform appendix; the omentum; the umbilicus; the abdominal wall (in postoperative scars); and the vulva and vagina. To these must be added another location reported by Sampson<sup>3</sup> at the 1926 meeting of the American Gynecological Society, the sac of an inguinal hernia, the patient also exhibiting a pelvic endometriosis and an endometrial cyst of the ovary.

### ETIOLOGY

The pathology of ectopic endometrial tissue is fairly clear, and its treatment is fairly well standardized, but discussion still rages about its origin, most of the confusion arising, as has been pointed out by Ewing and Frank, in particular, from

\* Read (by invitation) before the Caddo Parish Medical Society, April 5, 1927, at Shreveport, La.

an endeavor to make a single theory cover all manifestations of the condition. Cullen has proved incontrovertibly that diffuse uterine adenomyomas are definitely of invasive origin, but the origin of the various extrauterine types is less easily established.

The regurgitation or retrograde menstruation theory of Sampson would seem to cover practically all intraperitoneal new growths, and there is much to be said in its favor. His idea is that menstrual blood and cast-off endometrium are regurgitated through the tubes and come to rest on various portions of the pelvic contents, where, by a process of implantation, new growths with endometrial characteristics develop. He states, and other observers support his views, that in operating upon women in the menstrual period he has frequently seen blood dripping from the tubes, and he adds that this is a relatively frequent phenomenon if preliminary curettage has been done. Moreover, the experimental work of Jacobson,<sup>5</sup> and more recently that of Ferraciu,<sup>1</sup> seem to substantiate his views. Their work with rabbits, dogs and monkeys proves quite conclusively that endometrium, if scattered within the pelvic cavity, has the power of grafting itself upon injured peritoneum and reproducing a type of endometrioma similar to that observed in humans. In fact, Jacobson concludes his paper with the statement that the success of the experiments, the general location of the growths, their histologic character, the manner of their development, and their reaction to the ovarian hormone all substantiate Sampson's theory of the origin of most cases of ectopic endometriosis in the human being. An important point, however, is that results were practically negative unless the endometrial tissue was transplanted during the active stage of the estrus.

The chief opponent of Sampson's regurgitation theory is Novak of Baltimore, who makes out, we must grant, an excellent case for the opposition.<sup>7</sup> In a study of

literally hundreds of tubal sections, he found but seven cases in which endometrium was contained in the lumen of the tubes, and in none of these was the woman menstruating or even particularly near the time of her period. In at least five cases the particles of free endometrium were so large that it would seem impossible for them ever to have entered the tiny uterine orifice. In at least two instances definite endometrial tissue was found in the ovaries also, and Novak's suggestion is that these particles were moving towards the uterus rather than away from it. His personal experience, which likewise is borne out by other authorities, is that menstrual blood dripping from the tubes at operation is a real rarity. He does not believe that Jacobson's animal experiments are confirmatory of Sampson's theory, not only because after all there is no true parallel between animals who do not truly menstruate and human beings who do, but also because there is no similarity between the virile endometrium which Jacobson employed in his experiments and the dead or dying tissue thrown off during menstruation. In his opinion this theory cannot be accepted until two things are demonstrated: the capacity of the degenerated endometrium thrown off at menstruation to grow in tissue culture, and the capacity of such endometrium to grow on the peritoneum or ovary of the human being, or even of one of the lower animals. Because of the innate difficulties in the way, he does not believe that it will ever be possible to prove either of these points experimentally.

Novak himself champions the theory of metaplasia of the pelvic peritoneum as the origin of pelvic endometriosis. Stated briefly, he believes that since the celomic epithelium of the urogenital folds not only forms the germinal epithelium of the ovary and the follicular epithelium, but also becomes invaginated to form the lining of Mueller's duct, the endometrium and endosalpinx are therefore to be looked upon as mere modifications of the peritoneum,

and both peritoneum and germinal epithelium may at times show endometrial transformation, probably under the influence of some endocrine stimulus.

Somewhat allied to this is the theory that pelvic endometriosis is the result of developmentally misplaced Muellerian tissue, which is caused to grow by the same ovarian stimuli that regulate normal menstruation, and which spreads both by invasion and by transplantation. Both of these latter theories are tenable in view of the fact that the pelvis, as more than one writer has pointed out, is "a regular potpourri for tissue abnormalities of various types."

Sampson's explanation of endometrial tissue in the vulva, vagina and other distant areas, a possible metastasis through lymphatics, must be dismissed as merely speculative, since he himself admits that, although it is theoretically possible, he has never demonstrated endometrial tissue in a lymph gland.

Endometrial transplants in abdominal scars can be explained by none of these theories. The hypothesis of tissue rests cannot be entertained inasmuch as the abdominal wall is devoid of such structures, and the theory of peritoneal inclusions is equally untenable, because, as Lemon and Mahle<sup>6</sup> point out, if it were true, adenomyomas other than those of the uterus could be identified after operation. The most probable origin of endometriomas in this location is undoubtedly transplantation or seeding, analogous to the seeding of carcinomatous tissue in the incision of an abdominal wound, as has been repeatedly observed after hysterectomy. Moreover, repeated laboratory work from that of Chiara in 1887 to Mahle's recent studies, has shown that the conditions found in inflammatory tissue are ideal for the development of adenomyomatous structures, and this requirement is fulfilled in the tissue reaction which takes place in the abdominal wall following surgical incision. It remains, therefore, only to fulfil the mechanical requirement

of bringing to this prepared soil, as it were, the peculiarly specialized mucosal epithelium.

In operations where the uterus is opened, as cesarean section or myomectomy for submucous growths, such conditions are easily met, and it is easy to conceive that cells may be transplanted by the hands, the instruments and the sponges used, as well as by the dragging of the placenta over the edges of the incision. The interesting point, however, is that in less than a third of the cases of this kind recorded (the number is still less than fifty) did the endometrioma follow such a procedure. The bulk of the previous operations were supravaginal amputations, ventrofixations and suspensions. Since this is the case, I believe that Judd's theory that the transplantation occurred by means of the needle and suture material dragging through the endometrium and bringing fragments of it to rest in the abdominal musculature is substantially correct. Novak is unwilling to accept the theory at its face value on the ground that the very infrequent occurrence of endometriomas, as compared with the many thousands of laparotomies performed yearly, makes it unreasonable, although he admits that since virile endometrium is involved, the same objections cannot be raised here as may be invoked against the Sampson regurgitation theory. In my own opinion Judd's theory is more logical than Novak's i.e., that these growths in the abdominal wall originate from celom-derived peritoneum, with the irritative effect of the cicatricial tissue playing a part in stimulating the ectopic differentiation process. I might add that I know of two cases following cesarean section here in New Orleans, which have not yet been reported.

The clinical symptoms of endometriosis vary, of course, according to the location of the lesion, but in general we may say that pain is constant, and, if the history be traced backward, so to speak, it will be found to be almost invariably of a periodic character, and usually coincident with



the menstrual period. Acquired dysmenorrhea is a striking feature in most cases, and various irregularities of the menstrual flow are also present. If the bowel is involved, there may be symptoms of periodic obstruction, gaseous distention, rectal tenesmus and various gastric disturbances. The condition naturally occurs only in women, and only during the childbearing period. For some reason, repeated pregnancies seem to confer a species of immunity, as does pelvic inflammatory disease, whether of puerperal or specific origin.

the normal appearance of uterine glands. Occasionally the gland spaces enlarge and form large cystic cavities, probably as the result of pressure on their lumen from other tumors and the impossibility of discharging their contents; these cavities contain remnants of old blood, desquamated epithelium, and mucus and cell debris.

#### DIAGNOSIS

The diagnosis, unfortunately, is very frequently not made until after operation and microscopic examination, and then, in

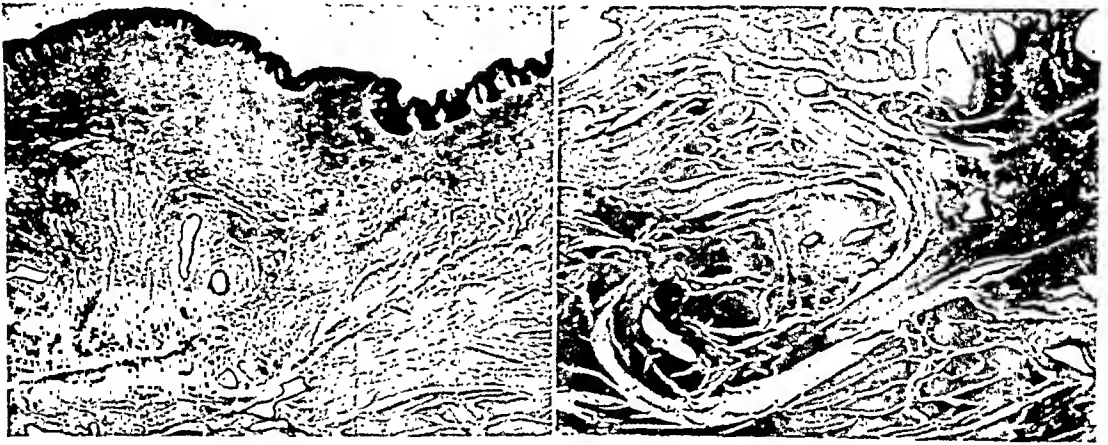


FIG. 1. Sections of scar excised from abdominal wall, showing endometrial transplants.

Pathologically the gross characteristics are always similar, except that in the ovaries, because of the original structure of the gland, the formation of cystic cavities filled with thick, chocolate-colored blood is most notable. Adenomyomas of the uterus and endometriomas of the abdominal wall bear a marked resemblance to each other. Section of such a tumor shows whitish bands of stroma running through it, with cystic spaces which contain a dark, tarry, chocolate-colored fluid, the remains of old hemorrhage and of mucus secreted by the glands. The stroma itself is made up of fibrous connective tissue, with bands of smooth muscle, which are easily stained, and also bands of striated muscle. The epithelium which lines the gland spaces is mostly columnar or cuboidal in type, while the glands themselves retain

retrograde examination, as it were, it is usually very clear. That is, the periodicity of the symptoms, which is the truly pathognomonic point, is seldom or never realized by the patient and is therefore not emphasized by her unless it is specially elicited by the surgeon in his questioning. When, however, the history is reviewed in the light of the laboratory findings, this point is made clear and the typical history is established. If the history is definite and the pelvic findings are clear, the diagnosis of course is apparent. Grossly, if the uterine tumor, pelvic growth or abdominal scar under suspicion shows small, cystic cavities containing chocolate-like material, the diagnosis is fairly certain. It is interesting to observe that a pathologist of Ewing's ability states quite without qualification that he would be willing to accept

as endometrial transplants those cases in which the structure is typical, in some instances even without the presence of endometrial stroma, if the clinical history indicates that some violence has been done to the endometrium or tubal mucosa that could reasonably account for a transplant or misplacement. On the other hand, he would be cautious in interpreting many of the simple epithelial rests in the pelvis as endometrial, even when endometrial stroma is present, without a definite clinical history.

#### TREATMENT

That the treatment of this condition is essentially surgical is fairly well established although just how radical it should be is still a matter of debate. Since the progress of the growth depends entirely upon the activity of the ovarian hormone, oophorectomy would seem to be the logical course, and certainly, if the process is in any way extensive, and particularly if the patient is advanced in years, no other procedure should be considered. In younger women, on the other hand, conservatism should be practiced whenever possible, even at the risk of a second laparotomy. Isolated growths in the vulva, groin, umbilicus, abdominal wall and similar locations should be removed as completely as possible. Growths that are invading the rectal and intestinal wall should usually not be touched, since the consensus of opinion and experience is that after ablation of the ovaries they will regress spontaneously. As far as I can judge from the literature, only one or two cases are on record in which this has not happened and the growth has continued to advance. While malignant changes may occur in the ectopic tissue, careful observation following a conservative operation will eliminate most of the dangers from this source.

The status of radium in the management of endometriomas is not yet clear. In younger women there can be no indication for its employment; surgery obviously

is the more conservative procedure, particularly when we recall the stormy menopause which early irradiation may produce. On the other hand, if the patient is near the menopause, it may perhaps be of value, provided the usual contraindications to its employment are borne strictly in mind.

In conclusion, while up to the present time endometriomas have been largely considered the business of the gynecologist, it would seem, in view of the many locations in which they may be found,



FIG. 2. Section of scar excised from abdominal wall, showing endometrial transplants.

that surgeons should become familiar with them also. There is no question but that they have opened a new chapter in the study of neoplasms in the appendix and bowel particularly, and Seelig<sup>9</sup> wisely points out that in them probably lies the explanation of many cases that have hitherto been loosely diagnosed as carcinoma, and for which much unnecessary surgery has been done. Moreover, the possibility of the transplantation of endometrial cells at operation should lead, as Ewing warns us, to greater care in avoiding what he vividly terms "mechanical insults" to the pelvic organs.

#### CASE REPORT

Mrs. W., white, aged thirty-eight years, consulted me in March, 1926, for a painful

abdominal scar. Her previous history was negative except for a supravaginal amputation done eight years before; she had no idea why it had been done, and we have never been able to locate the original record. Shortly after the wound had healed the scar began to hypertrophy, and from that time at intervals small cystic cavities repeatedly formed, from which sanious fluid was evacuated. The operating surgeon concluded that the suture material was responsible for the condition, but repeated local treatment produced no amelioration of the symptoms. The pain was

struation might have been expected to occur. During the ten months since operation there has been no recurrence of the symptoms. Unfortunately the history does not enlighten us as to whether or not the ovaries were removed with the uterus, and this could not be determined by pelvic examination. They probably were not, however, and if the trouble should recur, through failure to remove the growth in its entirety, I believe a single application of radium would be the wisest policy.

#### SUMMARY

1. The history of ectopic endometrial tissue dates from the work of Cullen on uterine adenomyomas in 1895 to the papers of Sampson in 1921 and succeeding years.

2. To date, misplaced endometrial tissue has been identified in fourteen different locations, principally pelvic.

3. Of the various theories invoked to cover its origin, no one is applicable to all types; most notable are the menstrual regurgitation theory of Sampson, the theory of metaplasia of the pelvic peritoneum, the theory of developmentally misplaced Muellerian tissue, and the direct transplantation or seeding theory.

4. The clinical symptoms vary according to the organ involved, with pain, particularly of a periodic type, almost constant, and the most characteristic finding is cystic cavities filled with thick, chocolate-colored blood.

5. Diagnosis is seldom made until after operation, when the characteristic gross and microscopic findings lead to a repeated study of the history, in which the periodicity of the symptoms is elicited.

6. Since these new growths are dependent upon the ovarian hormone for their development, surgical ablation of the ovaries is the logical course, although in young women conservatism is advised. The exact status of radium is not yet clear.

7. In view of the many locations in which ectopic endometrial tissue has been identified, particularly the appendix and various portions of the intestines, it would seem incumbent upon the general surgeon as



FIG. 3. High power view of section of scar excised from abdominal wall, showing cross section of glands and epithelial lining.

at times severe, of a stabbing character, and the fluid had a somewhat foul odor.

When I first saw her, examination disclosed a rather wide abdominal scar, extending from the umbilicus to the symphysis pubis, which was swollen and seemed somewhat turgid. As I did not believe that the theory of stitch abscess was a rational one, in view of the failure of the previous treatment, I excised the entire scar under local analgesia, and closed the wound according to the usual technique for laparotomy. Routine laboratory examination of the excised scar brought back the report of an endometrial transplant. In the light of this, the physical findings and history were quite typical, and the retrograde questioning, to which I have referred, brought from the patient the information that the pain and swelling in the scar were periodic, and in all probability coincided with the times her men-

well as the gynecologist to acquaint himself with the pathology and management of the condition.

8. A case is reported of endometrioma in the abdominal wall, following supravaginal hysterectomy.

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#### [SURGICAL SUGGESTIONS]

THE discharge at the nipple of blood or bloody fluid does not mean that an associated breast tumor is malignant. It does mean, however, a ductal growth that may be or may become cancerous; and it is always a source of surgical anxiety. The safest course is to remove the tumor and, if sections of the growth leave any doubt, to remove the breast radically.

CARCINOMA rarely if ever develops in an encapsulated mammary adenoma.

BREASTS that bear a mass accepted clinically as benign, or that have borne a mass accepted histologically as benign, should nevertheless be kept under periodic observation.

FIBROCYSTIC masses in the breast may cause so much mental distress or so much pain that their enucleation becomes justifiable.

# RADIATION FOR THE RELIEF OF MENORRHAGIA & METRORRHAGIA CAUSED BY FIBROMYOMATA

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IN the 22 cases on which this communication is based the dosage of radium in each was 1800 milligram-hours. Of this series the youngest patient was thirty, the oldest fifty-six, 9 were over forty and 9 were under forty years of age. The last of this series was done over a year ago, which enables us to see the end-results which were perfectly satisfactory. Ewing maintains that 50 per cent of all women over fifty years and 20 per cent of those over twenty-five years have fibromyomas.

Often fibromyomas that have for years remained stationary start to increase in size, sometimes rapidly at the menopause.

Formerly it was considered that fibromyomas the size of a four months' pregnancy were best cared for surgically but reports by prominent radiotherapists indicate a strong tendency to go beyond this limit.

Occasionally the pathologist finds in the center of fibromyomas proliferation showing beginning or quite well-advanced sarcoma. This condition may not be reached when radium is used although sarcoma in the uterus yields readily to the influence of radium.

Radium is said to be contraindicated where there is fixation of the uterus or evidence of old pelvic trouble, but I think the absorption from the tissues acted upon by the radium is quite as often the cause of infection shown by tenderness with elevation of pulse rate and temperature.

In none of the cases here reviewed was there acceleration of pulse or temperature

except very slightly and this, except in one case, was due to the radium and bloody fluid shut up in the uterus, for I *always fasten* the radium in the uterine cavity. Whatever rise in pulse rate or temperature there was disappeared at once on removing vaginal tampons and the radium.

Some two years ago I was asked, in reference to using radium in treating fibromyomas of the uterus: "May not a focus of partially devitalized tissue with altered blood supply favor malignant changes and would not fibromyomas be best cared for surgically?" Certainly it behooves us to follow our cases carefully to determine whether malignancy may not at times follow the use of radium or roentgen rays.

At the time radium is used for menorrhagia or metrorrhagia a careful examination is made by rectum under ether and the cervix and uterus are thoroughly curetted with a Sims' sharp curette. All tissue removed is examined by a pathologist.

The following shows the importance of curetting in every case and having the curettings examined. Two cases were sent into the hospital with fibromyomas for radiation. One was a very bad operative risk. In this case the pathologist found beginning adenocarcinoma at the base of a polyp just within the external os. Seven hundred milligram-hours of radium were used inside the cervix every three days for four doses. In this case the radium was fastened so as to extend just outside the external os.

In the other case with a fibromyomā in the anterior wall of the uterus the curettings showed adenocarcinoma of the cervix. Radium was used as above and six weeks following the first radiation a total hysterectomy was done. After careful and repeated examinations by the pathologist no evidence of carcinoma was found in the uterine body or cervix. At the time of curetting a probable diagnosis was made of carcinoma in the left side of the cervix just below the internal os. On opening the uterus at the time hysterectomy was done an excavation the size of a kidney bean was found in this location. In this case the radium was fastened so as to extend just beyond the internal os. The mortality after radiation for fibromyomas was nil.

After radiation the stay in the hospital averages forty-eight hours.

There is a recognized mortality of 5 per cent following supravaginal hysterectomy for fibromyomas.

After hysterectomy the stay in the hospital averages three weeks and it is six months before the patient is really herself again. In only 3 cases was it necessary to use the radium more than once.

The results following the application of radium inside the uterus depend on the extent and depth of underlying tissues acted upon by the radium. The destruction of the endometrium by the radium plays an important part in the cessation of menstruation.

Where a supravaginal hysterectomy is done and one or both ovaries are left, in order that menstruation may continue, some of the uterine body just above the cervix must be left or there will be no menstruation. I have had this fact demonstrated to me several times. In the spaying of a bitch both uterus and ovaries are removed, otherwise she will regularly come in heat. I believe the amenorrhea produced by radium is due in great measure to its action on the endometrium.



# MEDICAL TREATMENT OF GOITER ON RATIONAL LINES, AND THE THERMOGENIC SYSTEM\*

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THIS session coincides with the twenty-fifth anniversary of the appearance of my work on the Internal Secretions, the first book published on the subject. Your courteous invitation to address you, therefore, affords me the opportunity of submitting evidence to the effect that the views submitted therein have not only stood the test of time, but also that they can do much to extricate endocrinology from the maze of discordant theories into which it has fallen. Another feature, one upon which I shall lay special stress, is that in reality the ductless glands do not play secondary individual rôles in the body as now believed, but are constituent parts of a *great biochemical system which carries on the life process itself*.

While the whole medical field is suffering from the present endocrinological shortcomings, the study of goiter is also deeply obscured by it. Any serious effort to ascertain the cause of this state of things in order, if possible, to remedy it, soon reveals its underlying defect. Briefly, it is the prevailing obscurity concerning the *fundamental* functions of the true ductless glands. I have always urged that these organs collectively constituted a functional mechanism at least as important as any in the body, the respiratory, digestive and nervous systems, for instance. It is to the neglect of this fact that investigators owe the present obscurity in all endocrinological questions.

Many will doubtless recall that the late Professor Halsted,<sup>1</sup> of Johns Hopkins,

hardly twelve years ago, after studying the many fatalities attending the surgical treatment of goiter when the thymus complicates the process, concluded, to quote his own words, that "it must be evident to everyone that there reigns the greatest confusion on the subject of the functions of the glands of internal secretions." It was this same confusion which inspired the sworn statement of Dr. Woodyatt, of Chicago, during a memorable trial less than two years ago, that the present knowledge of the internal secretions could be compared "to darkest Africa before Stanley went in."

Special workers in the endocrinological field are no less explicit. This was shown by a series of articles published towards the end of 1924 in the *Journal of the American Medical Association*. Concerning the thyroid, Reid Hunt<sup>2</sup> held that "the mode of action of iodine in the thyroid is not known." Boothby and Plummer<sup>3</sup> also wrote that "the exact physiochemical status of thyroxin as it leaves the thyroid is not known." As to the adrenals, Hooker<sup>4</sup> declared that "epinephrin is not essential to life" and that while the cortex is, "nothing is known definitely about its physiology." Concerning the pituitary body, Howell,<sup>5</sup> of Johns Hopkins, recalling that French and American investigators had obtained results attributed to its "supposed secretion" by causing lesions above this organ, questioned the validity of present teachings. Swale Vincent,<sup>6</sup> of London University, alluding to these

\* Read, by invitation, at the Annual Meeting of the American Association for the Study of Goiter, Philadelphia, February 1, 1927.



experiments in the last edition of his book, also pointed to the need of "a reconsideration of our whole attitude in relation to the pituitary body." Macallum<sup>7</sup> denied precise knowledge of the different functions of the various cells in the parathyroids and questioned the soundness of the methylguanidin theory as a cause of tetany. As to the ovaries, Carlson<sup>8</sup> recalled that "none of the various hormones had been isolated" and expressed doubt as to whether "any of the ovarian functions could be maintained by substitution theory." The other endocrines, including the thymus, generally deemed of negligible import, were ignored. Books published during the year 1926 as vividly portray the same confused state of the subject as a whole at the present time.

If these estimates of the actual status of endocrinology represented the true situation, it could be truthfully said that the history of Medicine does not contain such a discouraging aggregate of scientific failures. As to its effects on Medicine as a whole, I could write a volume illustrating the innumerable pitfalls into which it is leading all branches of practice.

From my viewpoint, the prevailing confusion concerning the functions of the endocrine organs does not represent the true situation. A moment's thought will suggest the utter fallacy of accepting with equanimity what amounts to virtual defeat in a line of research to which at least thirty thousand close observers, including over three hundred investigators of the first order in all parts of the world, have devoted their best endeavors during the three-quarters of a century since the internal secretions began to be studied scientifically.

What then is the true state of things?

I would fail in my duty to suffering mankind and to the profession to which I have devoted fifty years of my life did I not frankly state that my own research, far more profound, widespread and prolonged than is now deemed necessary to prove any question, based as it was on what is

now known as the "synthesis of sciences" system, endows all the serious work on endocrinology with its true and inestimable value. Indeed, it converts the work done on the subject into a vast treasure house of knowledge out of which a true science of endocrinology, which will mean *the science of physical life*, can be evolved. Nor do I hesitate to predict that it will prove helpful in its development of Medicine as a whole, when it will have received the benefit of cooperative study of all medical workers, beyond any estimate possible at the present time.

Indeed, the profession at large does not seem to realize how deficient are the prevailing teachings, even in these days of great progress, concerning questions of the highest import in our daily work. The very essence of all tissue life and incidentally of disease, the manner in which oxygen carries on its all-important functions in our tissues, is still admittedly unknown. How then explain fever, the destructive influence of hyperpyrexia on life, hemolysis and autolysis, the fundamental death-dealing factor of the most fatal diseases, pulmonary, cardiac, vascular, hepatic and renal, of our day? All these processes and many others, sleep, even, are still mooted questions which are met by pure conjectures. The manner in which nerves generate their impulses has also remained obscure. How, in these conditions, does one account satisfactorily for morbid processes in mental and nervous diseases, a field so unsatisfactory at the present time even to its sponsors?

Another feature of commanding importance in this connection is the prevailing belief that the endocrine secretions, irrespective of glandular diseases such as Addison's disease, exophthalmic goiter, etc., are invariably benign as regards their systemic effects. I have often emphasized that they could become extremely harmful and even cause death. Your president, Dr. Goetsch, has been so impressed with the damage to pulmonary tissues that an overactive thyroid can produce that he

has advocated partial thyroidectomy to check the morbid process. Indeed, further study of this question will reveal that even though the purpose of glandular overactivity be defensive, it becomes a prolific cause of death when certain limits are exceeded. All this is overlooked in present-day medicine.

The innumerable shortcomings of which this brief summary affords but a limited idea might be taken to mean that physiologists, pathologists and other investigators have not done their utmost to enlighten us clinicians in knowledge so essential in our working field. Nothing could be more unjust. In truth, their painstaking efforts have been so handicapped by the absence in their lines of inquiry of the foundation which the ductless glands alone afford that the true value of their labors could not come to light.

I have been working three years on a treatise which will coordinate present knowledge in medicine with what the last twenty-five years have contributed to confirm my views. I did not hesitate to undertake this task, because all the literature of endocrinology, both pro and con, have concurred to supply the necessary confidence. Not only has experimental evidence from all sides, though sterile in all other directions, found a ready nidus in the views I have formulated, but, as succinctly expressed by Dr. George W. Crile at the Congress of Anesthetists of 1925, it is becoming clear, even in the opinion of physiologists to whom he had spoken, that modern investigations were serving only to confirm the soundness of my interpretations. Researches designed to test them by Menten and Crile,<sup>9</sup> and others, led to similar results. I might mention, among these, the two years' research at the Wistar Institute by its able physiologist, Dr. Frederick S. Hammétt, who at the 1925 meeting of the Association for the Study of the Internal Secretions stated that his work had fully confirmed the predominant functions in the body I attributed to the adrenals.

#### FUNCTIONS OF THE ENDOCRINES

What then are these fundamental functions of the endocrine organs or ductless glands?

The dominant and fatal error of our day in this connection is that of considering any ductless gland as a functional unit, working independently of any other endocrine organ. In truth, from my viewpoint, *all true endocrine organs are members of a single great system which sustains the life process itself in all tissue cells by providing them with heat energy.* Unitedly, therefore, they form what I have termed the "*thermogenic system.*"

This function, I may recall, is at present admittedly unknown. Ever since the discovery of oxygen, nearly a century and a half ago, all that has been shown is that this element reaches our tissues. What this means to general medicine may be surmised from Prof. Halliburton's statement, as recently as 1921, that "our knowledge of tissue respiration is so scant that we can say but little of its pathological bearing."<sup>10</sup> Again, several of the biochemical agents I have introduced after a comprehensive study are not referred to in textbooks as taking part in the respiratory process, even though found in all tissues by biochemists and histologists, and known to fulfill some important though obscure function.

#### RÔLE OF THE ENDOCRINE ORGANS IN THE THERMOGENIC SYSTEM

How are the various endocrine organs grouped so as to form the thermogenic system, and what is the rôle of each organ in that system?

The organs which actively contribute to the heat-producing process are the adrenals, the thyroid and the parathyroids.

1. ADRENALS. The adrenals contribute three substances. Their *medulla* secretes an oxidizing, catalytic enzyme that I have termed *adrenoxidase*, forming part of the hemoglobin molecule, the active principle of which is the familiar epinephrin or adrenalin, and which takes up the oxygen from the air in the lungs. Their *cortex*

contributes two substances: (a) *lecithin*, a lipid or waxy phosphatid containing nearly 4 per cent of phosphorus (which occurs in the heart as *cuorin* and in the brain as *cephalin*) and which when oxidized by the oxidizing enzyme *adrenoxidase* liberates heat and is therefore the true thermogen; (b) *cholesterin*, or better *cholesterol*, since it is a monatomic alcohol, serves to moderate the thermogenic activity of lecithin and thus keep the heat energy that this lipid liberates within physiological bounds.

These three agents are taken up by the red corpuscles while the blood passes through the adrenals, and are found in these corpuscles as well as in all tissue cells.

2. **THYROID.** The thyroid contributes what I termed *thyroidase* (1907) in which iodine, its active agent, is endowed with catalytic properties by the admixture of the catalytic oxidizing enzyme *adrenoxidase* previously referred to. Kendall's *thyroxin* (1914) is the active principle of thyroidase. The function of thyroidase is to activate thermogenesis and thus to accelerate metabolism, and oppose the inhibiting action of cholesterol. Its iodine, rendered catalytic by its associated oxidizing enzyme, fulfills this function by increasing the sensitiveness of the lecithin-phosphorus of the tissue cells and certain fluids to oxidation.

The thyroid secretion, including its iodine in organic combination, is also found in all soft tissue cells.

3. **PARATHYROIDS.** The parathyroids contribute a secretion which by combining with the hormone of the thyroid, thus constituting what I have termed *parathyroidase*, further increases its power to render the phosphorus of the lecithin more sensitive to oxidation and thus raise its thermogenic action to greater efficiency. Its purpose is to insure hydrolytic cleavage of highly resistant toxins, and likewise the spasmogenic intermediate wastes of metabolism, and also to provide for the formation of calcium phosphate in the bones

and other tissues. Waldemar Koch,<sup>11</sup> of Chicago, having shown that calcium becomes insoluble and is precipitated when lecithin is withdrawn from the blood, a result due to deficient heat energy, the parathyroid hormone as activator of lecithin takes an active part in bone upbuilding and repair.

4. **THYMUS.** The thymus is another gland that from my viewpoint is concerned with thermogenesis. But it is only an accessory gland, which functions during development to provide the excess of lecithin required by all tissues, the cerebro-spinal system and skeleton particularly, during that period. The lecithin is supplied to all tissues by their special leucocytes, whose nucleins owe their activity to their lecithin content.

#### GOVERNMENT OF THE FUNCTIONS OF THE THERMOGENIC MECHANISM

How are the functions of the thermogenic mechanism, which includes, we have now seen, the adrenals, thyroid, parathyroids and, in the developing child, the thymus, governed?

In 1903 and 1907<sup>12</sup> I submitted that the functions of the pituitary body included that of liberating nervous energy; that this gravitated in nerve paths up to the great basal nuclei in the tuber cinereum, and thence backward and downward to the bulb, spinal cord and sympathetic nerves to, among other structures, the various ductless glands. Time has sustained this conception. Briefly, *the pituitary body is a powerhouse for the production of biochemical nervous energy used by the great nuclei or ganglia in the floor of the third ventricle.*

The enthusiasm which led even investigators of the first order, at one time, to visualize internal secretions practically everywhere in the body, led them to accept with avidity the assumption that the pituitary body also contributed one or more of such secretions. But the tide has so decidedly turned, that I can safely urge, after a comprehensive and impartial review of the whole subject, that the secretion

theory be abandoned as misleading. This does not mean that pituitary preparations are valueless; far from it, but they should only be regarded as pharmacological agents.

As previously stated, French, American and South American investigators have obtained many effects attributed formerly to the so-called pituitary secretions, by practicing slight lesions on the basal tissues, above the pituitary body. If one notes the positions of these lesions, one will find that they are all situated in the tissues through which I had traced nerve paths from the above mentioned nuclei to the adrenals, thyroid and parathyroids, the endocrine organs directly concerned with thermogenesis. Again, this same nuclear area has been found by physiologists to contain heat centers, experimental punctures through the mouth but penetrating only to the nuclear area having been found to provoke thermogenesis and persistent fever.

#### PURPOSE OF HEAT ENERGY

Yet heat production represents but a phase, though an all-important one, in metabolism. What is the purpose of the heat energy liberated by the thermogenic system?

All tissues owe their vital activity to the enzymes they contain. As Mendel has so well said: "Enzymes are no longer thought of exclusively as agents of the digestive apparatus; they enter everywhere into the manifold activity of cells in almost every feature of metabolism." I would recall, however, that enzymes are active according to the heat, up to certain limits, to which they are subjected. It is the function of the thermogenic system to provide this heat. Regulated as it is by the basal pituitaro-nuclear mechanism it supplies the heat energy necessary to enable the tissue enzymes, trypsin, lipase, and others, to subject the ultimate food products in the tissue cells, to hydrolytic cleavage. When the heat energy liberated exceeds certain limits, the cleavage includes waste

products, i.e., catabolism; when still more heat is liberated and fever is noted, the cleavage process includes toxic wastes, bacterial toxins and other harmful agents vulnerable to hydrolysis. Briefly, *the endocrine organs, which constitute the thermogenic system and the tissue enzymes, jointly sustain life and defend it.*

#### APPLICATION TO GOITER CASES

The bearing of all this upon the pathogenesis of goiter now suggests itself. While affording a rational basis for its medical treatment, it also indicates, we shall see, how this can be done without interfering with surgical success, should operation become necessary. Concerning my own results in the large number of cases of all forms I am called upon to treat I will only state that they are such as to warrant my recommending the measures outlined below to my fellow clinicians, letting them judge of their value and add, wherever possible, to their efficiency.

The present tendency is to use iodine indiscriminately, a dangerous practice. Experience in the hands of discriminating practitioners tends increasingly to show that while it is of undoubted value preparatory to operative treatment (by avoiding, from my viewpoint, secondary failure of the adrenal mechanism), in the treatment of goitrous disorders without operation it is harmful. It may benefit the patient temporarily (because, as I interpret its action in this connection, it antagonizes a causal toxemia) but, after a time, all the symptoms return in an exaggerated form. The medical treatment on rational lines then becomes far more difficult, as my own experience with such cases has shown. Besides, iodine as employed by the general practitioner is a frequent source of hyperthyroidism where none would have developed without it.

Far safer in the hands of the practitioner is a method which might be termed *intrathyroid vasoconstriction*, based on sound physiological principles and extensive experience. As shown by Claude

Bernard, the activity of an organ is proportionate with the volume of arterial blood circulating through it. Hence a goiter is a thyroid gland which receives an excess of arterial blood. If, therefore, we constrict its arteries in any way, we reduce both its functional and proliferative activity, as well as its size. This applies to any form of goiter, excepting those in which the morbid structure is such as to have lost the nutritional influence of the blood: the hard nodular and fibrous goiters and all those which endanger life by causing pressure on the trachea including the large deforming goiters of long duration. All such are purely surgical, along with certain adenomas to be specified later. Goiters which extend under the sternum are contracted by ergotin, affording relief, while iodine is dangerous in such growths because it increases the colloid in them, thus causing enlargement and pressure symptoms.

By far the best vasoconstrictor to use is the familiar ergotin, long employed by Huchard, Marinesco, Forchheimer, Shattuck and other prominent clinicians. But good results require a pure product and sufficiently large doses. When prepared by any reliable druggist according to the French Bonjean method, it is extremely effective. Its dose limits being wide, from 1 to 8 grains, its action can be carefully graded. As some subjects are sensitive to its effects, particularly where the basal metabolism is low, it is best to start with 1 grain three times daily, increasing the dose gradually, but watching the patient closely lest phenomena of excessive vasoconstriction, tingling, hyperesthesia followed by anesthesia, muscular cramps, etc., occur. It may be given, as advised by Forchheimer, with neutral quinine hydrobromide, also a vasoconstrictor, in 3 to 5 grain doses in salol-coated pills, if no cerebral symptoms be present, but if such exist the salicylates or the bromides are to be preferred as adjuncts. The pharmacodynamic action of intrathyroid vasoconstriction is comparable to gradual liga-

tion of all the small arteries supplying the gland. Gradually as its blood supply is being reduced it undergoes progressive starvation.

I shall now review briefly the three dominant forms of goiter as interpreted and treated medically in the light of my views.

**ADOLESCENT GOITER.** The true pathogenesis of adolescent goiter is now admittedly unknown. As I interpret it, however, it is due to somewhat delayed involution of the thymus. The resulting presence of an excess of nuclear lecithin in all tissues accelerates the basal metabolism, usually from normal to between +15 and +30, and causes a slight rise of blood pressure, some irritability perhaps and often acne, mainly over the shoulder blades. Toxic wastes being produced in excess, the thyroid, if insufficient from any cause, becomes enlarged to provoke a defensive reaction in the manner described. They may cause death after thyroidectomy in persistent thymus.

Thyroidectomy is contraindicated in adolescent goiter; so is iodine, for it causes colloid swelling of the growth. It is absurd to tell these young people, as some do, to "forget their neck." Disfigurement is a punishment to them. The vasoconstrictor treatment will reduce the volume of arterial blood supplied to both the thymus and thyroid, while a small dose of desiccated thyroid ( $\frac{1}{2}$  grain) given with ergotin, in a capsule, thrice daily, will gradually relieve the thyroid itself of the need of overfunctioning. Occasionally foci of infection, usually in the tonsils, are encountered; any such require correction. A low meat diet favors recovery.

**ADENOMATOUS GOITER.** While this condition is attributed, since Woelfler's work, to new acini from embryonal tissue, a very problematic origin, the fact remains that the vesicles, few or numerous, encapsulated or not, when fully developed do not differ histologically from normal ones, and function similarly. While nodular, they have the same tendency to produce hyperthyroidism, and their surgical

removal is followed by prompt lowering the basal metabolism. Moreover, adenomatous tissue stores colloid and iodine, while, as Plummer states, various observations make it probable that "the hyperthyroidism associated with adenomatous goiter is due to excess of the normal active agent of the thyroid in the tissues of the body."

Interpreted from my viewpoint, these and other facts show clearly that the whole meshwork of theories which have been wound about this form of lobular goiter does not alter the fact that we are dealing simply with an overactive gland, but one occurring in the great majority of instances, in middle-aged people or in late adult life. Many sources of toxemia, such as repeated pregnancies in which the maternal and fetal wastes which tax heavily the thyroid gland, as shown by its frequent enlargement during pregnancy, menopause, pyorrhea alveolaris, carious and abscessed teeth, hepatic and gall-bladder disorders, constipation, etc., are thus added to those which expose young people to hyperthyroidism. In some of my cases, arthritis, arteriosclerosis, asthma and other disorders traceable to a toxemia prevailed simultaneously. Attention to these causal factors, which are sometimes attributed to the goiter, contributes to its recession.

Thyroidectomy, now generally recommended, is an efficient resource doubtless in this form of goiter; it lowers the basal metabolism which is often very high and also the symptoms of hyperthyroidism. But these are only s.o.s. signals and the causal disorder is left to itself to cause resumption of the hyperthyroidism after a time through overstimulation of the remaining tissues. The medical treatment with removal of the causal disorder, if attainable, is more satisfactory, though slow, in the long run, especially if the vasoconstrictor treatment is also resorted to. These measures, with ergotin, will cause the goiter to shrink through denutrition, as even the nodules need blood to keep them filled. There is no operative or post-operative mortality to consider, while all

the physiologically normal portions of the gland are preserved.

Adenomatous goiter yields to medical treatment when seen comparatively early but when long preceded by a benign goiter surgical treatment is to be preferred.

**EXOPHTHALMIC GOITER.** The treatment of this condition introduces various points which my views tend to elucidate. We have seen that while the manner in which an overactive gland is stimulated is unknown; this applies also, as Boothby and Plummer stated, to the chemical reactions carried out by thyroxin in the tissues. This is the crux of the whole question.

The prevailing obscurity concerning the cause of thyroid overactivity is due to the fact that the old "detoxitory" theory, in virtue of which the thyroid itself intrinsically, or through a direct action of its secretion in the tissues, destroys poisons, has, and rightly too, been discarded. My own view has never been, and is not now, similar to that theory.

Briefly, from my viewpoint, the thyroid secretion, be it thyroiodase or thyroxin, by increasing thermogenesis in all tissues, accelerates metabolism, both anabolism and catabolism, the latter phase including, by raising the hydrolytic power of enzymes, the cleavage of certain poisons. It is in this connection that absolute rest so greatly hastens recovery. By reducing the wastes due to exertion, it diminishes materially the defensive activity of the thyroid and, as a result, the overoxidation of the cardiac phospholipoid cuorin.

This gives us not only an insight into the true pathogenesis of exophthalmic goiter, but also a key to its successful treatment. Here also the importance of focal infections must be fully recognized. Even the many cases due to mental stress, worry, sorrow, fear, shock as in automobile and other accidents belong to this category. They initiate and sustain in the cell bodies of the cerebral neurons, particularly, a shock which disturbs their molecular equilibrium and initiates the production of wastes of a highly toxic character. Concomitantly they produce a shock—parcisis

of all arterioles, causing general vasodilatation. Cases due to tonsillar or dental abscesses have been relieved in a few weeks in my practice merely by removal of the causal infection. Most cases, however, require months, sometimes many, before restoration of the neurovascular equilibrium is restored. In all such the vasoconstrictor treatment is extremely effective by causing constriction of the arterioles of the entire body, besides those of the thyroid itself. All the symptoms gradually disappear, because the general constriction it produces *not only reduces the production of the thyroid secretion but also the amount of lecithin admitted to the tissue cells.*

Again, we are furnished a clear explanation, with lecithin as the agent acted upon by the thyroid secretion, of the symptomatology of the disease. The cutaneous heat and the sweating, for example, are combined effects of the passive dilatation of the peripheral arterioles and of the excessive thermogenesis provoked. The exophthalmos is also due to the general vasodilatation and the resulting postocular engorgement, for the vasoconstrictor principle of the adrenals is in reality the oxidized cortical lecithin. The diarrhea also results from this cause, the flux being due to passive dilatation of intestinal vascular supply. The fibrillary tremor is due to two causes: dilatation of the neural vascular supply and excessive oxidation of the neural lecithin, a third factor, muscular irritability from the same cause, participating. The progressive emaciation is a normal result of the excessive oxidation of the lecithin in all tissues which entails the rapid hydrolysis of all fats. The tachycardia is also due to excessive oxidation of its physiological phospholipoid cuorin, which is practically similar to lecithin molecularly. All these morbid phenomena are gradually counteracted by administering (1) lecithin, to compensate for the excessive consumption of this phospholipoid in the tissues (which accounts for another symptom, the supernormal appetite) and (2) vasoconstrictor agents, ergotin notably, to constrict all arterioles, thus

limiting the thyroid overfunctioning and also that of the tissue cells.

This paper being restricted to the medical treatment of goiter, many other resources of value, the roentgen rays, radium, electricity, etc., are not discussed. I regard them, however, only as adjuvant measures.

Finally, I would urge the treatment by intrathyroid vasoconstriction for another reason. While every effort should be made, regardless of the time required, to restore the thyroid gland to its normal functional condition, since, as we have seen, it is the physiological accelerator of metabolism and a participant in the defensive functions of the body, nothing should be done which might compromise the success of operative procedures should such become eventually necessary. This applies so eminently to the treatment I advocate that our distinguished surgeon, Dr. John B. Deaver,<sup>13</sup> has recommended the ergotin and quinine treatment as a preliminary measure to thyroidectomy. Nothing that I could say would more fittingly sustain my plea in this connection.

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# MALIGNANCY OF THE THYROID\*

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MALIGNANCY in the thyroid pursues its devastating course to the same destructive end as elsewhere. The early diagnosis is desirable, but is very difficult, inasmuch as the same symptomatology that we expect in malignancy is present also in other types of goiter, particularly adenomas and colloidal goiter. The gland is hard and nodular in malignancy, but the differentiation between these nodules and those of adenomas or small cysts is clinically difficult. We expect loss of weight and cachexia in malignancy over a period of time, but we see the same symptoms in toxic goiter. So close is the similarity between malignancy of the gland and toxic adenoma, that in most instances malignancy cannot be definitely diagnosed before operation, at least in the early cases, and the difficulty is made harder, inasmuch as the two are found so often together. We have always found cancer in the presence of thyroid disease of other types and never in the absence of it. This seems to be consistent with malignancy in general, in that irritation of tissue, with hereditary tendency toward cancer, causes its onset. The thyroid is chronically irritated by the causative factor of goiter with the result that in people in whom cancer can develop, the malignancy appears. The proper time and treatment of malignancy, wherever found, are complete removal when first seen, except when the disease is already widespread. The problem is unusually difficult, because many individuals who would apply for aid to the surgeon at once if they suspected cancer, are misled by the appearance of the thyroid into believing they have a simple goiter, and with the lack of severe toxicity, many procrastinate in having the thyroid removed until metastases have developed.

Fortunately, cancer of the thyroid is generally slow in developing and metastasizes much slower than in the breast or stomach, and so the disfigurement will occasionally bring a patient to the operating table in time to remove the tumor safely. It is a sad commentary that physicians many times will attempt to treat these cases medically in spite of the fact that diagnosis is either adenoma or malignant growth, in either case the condition being unequivocally surgical. Education of both physicians and patients to have all goiters in which nodules appear removed early seems the only way of getting them removed before cancer develops. The patients that have the best chance of recovery from malignancy are those in whom the diagnosis has not been made before operation and is found on sectioning the gland. These will, in a large percentage, recover and have few recurrences if radical removal is done, particularly if the nodules are encapsulated and the blood vessels and stroma are free from cells. After the cancer has broken through the capsule by direct extension or through blood vessels, or by lymphatics, no matter to what slight degree, further extension is assured. I do not know of a cured case in which the diagnosis was made before operation.

Cancer starts often in the nodules of fetal adenoma. In a recent address at Toledo, Crile stated that he now has three generations of patients in which the thyroid gland has been observed and treated, both medically and surgically, and that these adenomas can be definitely eradicated from the child by the administration of iodine to the mother before pregnancy occurs. If suitable quantities of iodine are given, no fetal inclusions will develop. This shows us the way to the elimination of

\* Read at the Annual Meeting of the American Association for the Study of Goiter, Philadelphia, Feb. 1, 1927.

much of the irritation in the gland and the method of prevention of the cancer-originating process in the thyroid. With this care being taken more generally, with education for early surgery in this type of disease, and with whatever the future may bring in the way of cancer treatment, we may hope for the best results in treatment.

None of my cases of carcinoma has developed in true Graves' disease, nor can a careful search of the literature bring forth an authenticated case of such a development. If toxic adenoma and Graves' disease are separate entities then occasionally there occur the two conditions in the patient at the same time, in which instance it is possible for carcinoma to develop synchronously with Graves' disease in the same gland. Carrel-Billard in 1900 reported in regard to thyrotoxicosis developing with metastases that exophthalmos had developed after metastases and not before. I have not seen this statement elsewhere. If this were true, it would substantiate Graham's theory that there is no essential difference between toxic adenoma and Graves' disease. There would occur the situation of a Graves' disease developing out of a toxic adenoma.

All carcinomas have come in cases in which an early colloidal goiter was present, or in which a nodule could be felt. Recurrence may be very slow, coming in some cases after five years, which period therefore cannot be considered a safe limit.

Where the metastases are massive in other parts of the body, even with a complete thyroidectomy symptoms of thyrotoxicosis occur, demonstrating that the thyroid type of cell is metastasizing, developing toxicity from the new growths.

The ordinary types of malignancy are adenocarcinoma, medullary carcinoma, and scirrhus carcinoma and sarcoma. The carcinomas many times are not clear-cut and show intermingling of types, the largest percentage being adenocarcinomas. Simpson denies that most of these develop from fetal adenomas, only five out of fifty-five cases starting in this way, but the origin was mostly in colloidal adenomas or

papilliferous adenomas, either from multiple or single adenomas. Even a very small cancerous development can send out large numbers of metastases. There is no connection between the size of the cancer and the number and size of the metastases. Because it appears that metastases may be single, it seems wise to remove all signs of the gland and metastasis as soon as seen.

The earlier writers on this subject gave statistics on sarcoma almost equalling carcinoma in number, but at the present the number given by the best authorities is about one sarcoma to ten carcinomas, some writers denying entirely the presence of sarcoma in the thyroid. Metastases to the lung and to the bone are the most common, but in one of my cases the metastasis was in the stomach and no others were seen.

At different times there have appeared reports of benign metastasizing of thyroid tissue. If this were true, however, it would be necessary to change entirely the definition of metastasis and malignancy. Thorough investigations of some of these reported cases have shown that death ensued from carcinoma of the thyroid gland; there remains no doubt that a metastasizing thyroid is definitely malignant.

Different authors have variously given the percentage of cancer in all cases of thyroid resections. The variation is from one to four per cent, with the most reliable figures tending toward the higher figure. With very careful examination of the gland and sections more cancer is found.

#### SUMMARY

1. Carcinoma occurs in about 3 per cent of all cases of thyroid resections.
2. Patients have a good chance of recovery if the diagnosis of malignancy is made by the pathologist and not by the surgeon, i.e., postoperatively.
3. Metastases of the thyroid are of thyroid type cells developing thyrotoxicosis.
4. A nodular gland is surgical; removal early will save many from carcinoma death.
5. Extension is early by way of the blood vessels, later direct and by lymphatics.
6. There is no such thing as benign metastases of thyroid gland.

# MANAGEMENT OF GOITER CASES AND SOME OF THEIR COMPLICATIONS\*

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BEFORE going into the different phases of goiter, let us continue to impress upon each other the great value of a careful history and a thorough physical examination, because too often an early toxic goiter is diagnosed incorrectly and because thyroid disease is so frequently associated with unbalanced or diseased other ductless glands (one or more), with focal infections, with uterine fibroids, with diabetes, with cardio-renal-vascular diseases, with tuberculosis, etc., that the best results cannot be obtained until all the data are weighed and remedied if possible. Common sense in the management of thyroid cases is an absolute requisite because so often one must decide which of these conditions should be looked after first and oftentimes this can only be answered at that particular bedside. Laboratory aids and metabolism tests are often very helpful but judgment and experience should render the final decision.

Our methods of examining the neck for the pathological thyroid are to stand behind the patient and with the thumbs first behind the superior and later behind the inferior poles, palpate the gland with the fingers gently and carefully; we also displace the trachea to either side of the neck so that with the other hand we can more accessibly palpate the gland. Too often an early goiter case is overlooked so if the least doubt exists, repeated examinations and repeated metabolism readings should be made until the diagnosis is clear. Thoracic goiter may be detected by the following: often there is a displacement of the thyroid cartilage easily noted by the notch not being in the midline, the full episternal space, the vascular pressure

symptoms on the chest, neck and face, and roentgen-ray findings. Care must be used to rule out aneurysm of the arch of the aorta and tumors of the mediastinum. Both thoracic goiter and aneurysm may be present, a very ticklish condition.

A simple way to classify goiters clinically is to divide them into the medical thyroid and the surgical thyroid.

## THE MEDICAL THYROID

The medical thyroid, of course, includes the deficient gland, as in the pure cretin and the myxedema case, but it must be remembered that if it is associated with a nodular goiter, it is also surgical.

The most frequent medical thyroid is the one of uniform consistency and of uniform enlargement which has been brought about by an increased demand upon the gland for its internal secretion. This causes the gland to become enlarged and exhausted from overwork, similar in many respects to those cases of temporary diabetes due to an exhausted pancreas. This condition usually occurs in children, at puberty and during pregnancy. The only subjective symptoms, if any be present, are slight nervousness and feeling of fullness in the neck; oftentimes the patient is unaware of its presence. Some of these enlarged thyroids return to normal when the demand returns to normal without any aid except good nutritious food, rich in vitamins and body ingredients. Many glands return to the normal by the judicious supplying of the active agent of the gland in the form of thyroxin or the administration of any iodine preparation; these must be administered with utmost care and supervision and it is here that periodical metabolism readings are of great value to

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help estimate the amount of iodine necessary to relieve the over-demand, yet not flood the system and unbalance the gland.

It is a very dangerous procedure to permit the wholesale distribution of iodine preparations by welfare workers, boards of health, medical newspapers and magazine journalists, school nurses, patent medicine houses and salt manufacturers, because too often a seemingly quiet goiter with a small adenoma is thus changed to a severely toxic goiter. Iodine in the hands of the uninformed is just as dangerous or more so than pituitrin in obstetrics and insulin in diabetes to those who do not know their uses, and is probably much more abused than those excellent agents.

If the uniform enlargement of the gland has persisted too long, the thyroid will not return to normal even under proper medication, especially in the patients who have passed the early twenties. These cases then become surgical thyroids with the exception of those occurring during pregnancy and that respond to medication.

It is well always to keep in mind that any thyroid may suddenly become toxic as the result of any acute infection but this is not as frequent as in the non-toxic, surgical goiter to be taken up presently.

The syphilitic thyroid is rare and of course is medical but it is well to remember a syphilitic may have a surgical thyroid.

In all medical as well as surgical thyroid cases, the treatment should of course include the cleaning-up, if possible, of all focal infections present and carefully looking after all intercurrent maladies.

The best prophylactic treatment to our minds is to give good nutritious food, rich in vitamins and body ingredients at meal time and the use of boiled or distilled water for drinking purposes, especially in goiterous districts. Too many families today are eating out of tin cans and it is a wonder there are not more nutritional deficiencies.

The free information in the lay press, accompanied often by the prominent essayist's picture, under the captions, "Propaganda for the prevention of goiter,

cancer, tuberculosis, etc." to our minds lowers the profession in the estimation of the public and puts it on the level with the quack and the patent medicine house. If this effort were directed to help inform our professional brother who does not or cannot attend medical meetings or avail himself of the recent medical literature, then it would be doing the community a real service.

A more dignified method to present these matters to the public is for the profession, through the press, to teach the advantages of periodical consultations and thorough physical examinations by competent physicians and by these obtain the needed advice and, if indicated, treatment.

#### THE SURGICAL GOITER

The surgical goiter includes all the rest of the pathological thyroid glands, as the nodular goiters, which include adenomas, cysts and colloid degeneration, the hyperplastic glands, and also those thyroids that have undergone malignant change. If this process has gone so far as to be clearly diagnosed malignant preoperatively, it is a grave question whether operation is advisable as it is nearly always too late. A thyroid which suddenly becomes enlarged and hard, ruling out of course acute thyroiditis and the woody-like thyroid described as Riedel's disease, is very suggestive of malignancy, as in the patient with an adenoma who develops a sudden change in voice. These should receive surgical relief at once.

All thoracic goiters are surgical and should be operated upon as soon as diagnosed because the longer they persist the deeper they go, the more pressure symptoms they produce and the more difficult they become to remove. Care must be used to rule out aneurysms and non-thyroid mediastinal tumors.

The uniformly enlarged thyroid of firm consistency that does not respond to medical treatment or in a patient past the early twenties, as well as all toxic goiters no matter of what physical state, are surgical.

Toxic goiters in this paper include all thyroids that have become very vascular, that produce tachycardia and cardiac murmurs and dyscrasias and are accompanied by muscular weakness, loss of power, tremor, great nervous excitability, vertigo, ocular symptoms, and those cases which have intermittent diarrhea, vomiting or sweating without apparent cause, those with psychical disturbances and with the very frequent symptom of rapid emaciation with a good appetite and plenty of food.

Some of the small toxic goiters are too often incorrectly diagnosed and treated as an early tuberculous case with those indistinct or latent changes that the tuberculosis specialists often speak about. The same may be said of those cases too often treated by our neurological colleagues as neurasthenia. Careful examinations and metabolism readings would clear up these cases and the chest specialists and neurologists would then recommend surgery and permit these cases to enjoy health once more.

Tuberculosis and surgical goiter may coexist and tuberculosis is no contraindication for operation but is indicated and often greatly improves the ultimate result.

Too often the toxic goiter is overlooked in children, especially those of the so-called exophthalmic type.

*Preoperative Treatment.* Preparation of the surgical thyroid is of great importance.

For the toxic goiter, if myocarditis be present, large doses of digitalis are indicated until the full physiological effect is obtained. Do not operate on heart cases with auricular flutter or fibrillation until remedied by digitalis. Rest in bed for five days to two or three weeks or longer is indicated in these cases and in order to obtain this it may be necessary to give bromides, barbital, luminal, trional or allied drugs, paraldehyde, or morphine alone, or in combination with scopolamine. A suppository containing codeine and trional has been very satisfactory, especially for those whose stomachs are easily upset.

Lugol's solution in most cases where there is even a small amount of hyper-

plastic gland is very beneficial preliminary to operation. It may be given alone or combined, over a short period of time, but should never be given except under these circumstances or possibly in the case of an active exophthalmic goiter in the latter stages of pregnancy. If Lugol's solution is given too long, symptoms become much worse and operation is very hazardous.

Lugol's solution works almost magically on some severely toxic cases of the so-called exophthalmic type in that the gastrointestinal or mental crises will rapidly disappear, the heart quiet down and the basal metabolic rate fall toward the normal, and the acute hyperthyroidism following operation is nearly all done away with. Lugol's solution is best given by mouth in from 10 to 20 drop doses in a glass of loganberry or grape juice every two to four hours. If necessary it may be given per rectum, using a dram of Lugol's to 6 ounces or 5 per cent glucose solution or, if this is not tolerated, sodium iodide solution should be given intravenously.

If edema be present, no operation should be advised until diet and medication have been tried to relieve it. In those persistent edema cases where there are no casts, salargyn in 2 c.c. doses intramuscularly every second or third day not only rapidly helps the edema but also seems to quiet the toxic goiter. A salt-free, low protein diet is here much indicated. If this fails to get rid of the edema it is remarkable how well these seriously sick patients will respond to operation; the results are very gratifying for such a group.

If medication, rest and diet fail and the patient is rapidly growing worse and operation seems imprudent, the injection of quinine urea hydrochloride, 25 per cent, into the gland is worth a trial, and often permits the case to become operable.

In a case of toxic goiter with hyperplasia in the latter months of pregnancy, do not operate upon the thyroid but give Lugol's solution and do an elective cesarian section to relieve the load on the system. Thyroid surgery in these late cases is absolutely

contraindicated because of the hazard of the increase of the vascularity of the already toxic gland and the danger of induction of premature labor. After cesarian section, when conditions will allow or demand, do a many step operation or partial thyroidectomy. When an active toxic goiter appears in the early months of pregnancy do multiple step thyroid surgery, as vascularity has not yet increased so much and the liability of inducing premature labor is not so great or so hazardous.

What applies in toxic goiter also applies to the non-toxic, namely that the diet should be high in carbohydrates but low in protein and fat, and should be salt-free, while the fluid intake should be at least 3000 c.c. in each twenty-four hours before and after operation is done.

The reason the mortality in goiter surgery has been greatly reduced is because we have begun to learn more about preparation and after care, but the most important fact is not trying to do too much at any one time. It is much better to err on the "doing too little" side at any one stage on these severely toxic goiters.

Before operating on a thyroid case, it is well to have a laryngologist examine the larynx to ascertain if there is paralysis of the recurrent laryngeal nerves. It is likely the recurrent laryngeal nerve paralysis is of toxic origin, as the paralysis due to toxins of diphtheria, although it may also be due to pressure as formerly thought.

The aptly named "trial ligation" by Dr. Crile is of great service in these severely toxic cases, not simply because it improves the patient's condition but because it gives an idea of the resistance this particular patient has and informs us whether a lobectomy or more surgery can be safely done or whether we should stop here. It is a matter of personal choice whether the ligation be at the upper or lower pole. Of course there is only one scar if inferior thyroid vessels are ligated. Right here may we say that basal metabolism is of little or no help in determining the

operability of a case but trial ligation gives valuable information, with the other data.

It is of advantage to operate on the severely toxic cases upon the bed, providing we have competent team work, because it does away with the excitement of being moved to the operating room, the exposure received while being wheeled through the halls and being lifted back and forth from the table and thus gives the patient that much more reserve, which may be the deciding factor of resistance. However, if the assistants rotate, the operating room is the safer place.

*Anesthesia.* Local anesthesia or combined anesthesia, namely local anesthesia plus a little gas, seems to us the safest and best. Ethylene is our preference for gas. With this we have no dehydration, no excitement stage, no change in blood pressure and little or no vomiting. Morphine and atropine seem to be the most satisfactory preliminary drugs, although in highly nervous cases we have used morphine with scopolamine with much satisfaction, but it must be remembered that some people have an idiosyncrasy for this drug and get a "scopolamine drunk." If this is present, postpone operation until it is over and resort only to morphine and atropine the next time. Local anesthesia alone is best for thoracic goiter, because after the capsule and upper pole are loosened, if we have the patient cough, often the thoracic portion of the goiter will deliver itself.

*Operative Technique.* All are acquainted with the different operative techniques, as they are all some modification of the original Prof. Kocher operation. The secrets of the operation are an adequate incision, finding the different planes of cleavage, gentleness, complete hemostasis and adequate drainage. A very frequent mistake is to make the incision too low, especially for the large goiters, and the scar falls on the chest. To our minds it is unnecessary to cut the neck muscles transversely; if the goiter is large or very adherent, the longitudinal separation on either side is

better and permits an adequate approach.

If, during the operation, the trachea should unfortunately be punctured, simply sew it up and the drain will protect the wound. If the trachea collapses but can be expanded with forceps, it may be possible to suture it to the sternocleidomastoid muscle or it may be necessary to insert a tracheotomy tube for 3 or 4 days.

If the case develops aphonia and the posterior capsule has not been molested the aphonia is probably due to the inflammatory reaction or to toxins and will disappear usually within four months.

If the recurrent laryngeal nerve has been unfortunately severed when removing a malignant thyroid and it can be reunited, this is the best procedure, otherwise the operation devised by Dr. Fraser, namely the transplanting of the descending hypoglossi and anastomosing it to the severed end of the recurrent laryngeal nerve, may be resorted to. In his hands it has brought nice results.

If one of the larger vessels has slipped away while you are working, remember that the greatest hemostats ever made are your fingers. Use them and then sponge and see the vessel, catch it with a forceps and tie it off. You will never injure anything by using your fingers and you can easily do much damage by diving in the dark with instruments.

In the severely toxic cases, the packing of the wound open with 5 per cent iodoform gauze for a day or more lessens the reaction and the wound later may easily be closed under gas anesthesia. We prefer the iodoform gauze because the absorption of this small amount of iodine helps prevent so-called postoperative hyperthyroidism, as does the Lugol's solution. In non-toxic or moderately toxic goiters, we simply use a rubber dam drain and close.

**Postoperative Care.** Following the operation, fluids and easily digested carbohydrates should be pushed, or if not tolerated by mouth, fluids should be given intravenously in the form of glucose, 5 per cent to 10 per cent solution, blood transfusion,

normal salt given by hypodermoclysis, or the glucose-normal salt solution per rectum. Lugol's solution in the proctoclysis helps prevent the so-called postoperative hyperthyroidism or, if this is not retained, sodium iodide may be used intravenously. If hyperpyrexia should occur, lift the patient into the bath tub and give her an ice water bath or pack iced blankets around the patient. Rest postoperatively is imperative, as it is preoperatively, and should be brought about in the same way.

**Abscesses of the thyroid** should carefully be opened by the use of a blunt forcep after careful exposure of the gland has been made, and free drainage accomplished by using a large iodoform gauze drain.

**Complications.** In cases of toxic goiter and diabetes, it is imperative that the urine become sugar free before operation, that local or combined anesthesia be used, and that the urine be tested every four to six hours after operation so if evidence of acidosis appears, glucose and insulin may be given intravenously. The latter management shows most gratifying results. It is always well to warn the relatives of diabetics of their greater liability to embolism than any other class of cases.

If a large fibroid uterus complicates a toxic goiter, treatment depends on which is the more active; if evidence be equal look after the thyroid first.

In cases complicated with an acute gall-bladder condition, about to rupture, do a hurried cholecystotomy. If a suppurative appendix exists, operate on it first, but use gas or local anesthesia if possible.

Cysts or fistula of the thyroglossal ducts are often mistreated and if not carefully and thoroughly dissected out, make a very disagreeable situation, especially if associated with a goiter.

**Radium and Roentgen Rays.** I mention the use of radium and roentgen rays only to say that when we wish to destroy diseased tissue, we should use the knife or cautery. Thus only may we know accurately the extent of destruction and not injure healthy tissue.



# GASTRIC AND DUODENAL ULCER

## CONSIDERATIONS IN THE DIAGNOSIS AND TREATMENT

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THE subject of gastric and duodenal ulcer, especially in the diagnostic and therapeutic aspects, is one that must of necessity be of constant interest to every internist and surgeon. Our great familiarity with these conditions and the many clinical questions that arise in connection with them should give scope for a good and broad discussion.

### GENERAL CONSIDERATIONS

*Age Incidence.* A glance through statistics shows that after the twentieth year of life acute and chronic ulcers of both the stomach and duodenum occur with fairly uniform frequency throughout the decades, but are more frequently seen in the fifth and sixth decades. Ninety per cent of chronic gastric ulcers and more than 80 per cent of chronic duodenal ulcers occur between the ages of thirty and seventy years. Chronic gastric ulcers occur later in life in men than in women, but they are more frequent in men.

*Relative Frequency of Gastric and Duodenal Ulcers.* It was formerly considered that duodenal ulcer occurred much more frequently than gastric ulcer. This opinion was based on clinical and operative findings, but more recent investigations show that there is a greater equality in occurrence. Thus Stewart<sup>1</sup> in a consecutive series of 6800 necropsies found 150 chronic gastric and 200 chronic duodenal ulcers, and the figures of other investigators show that gastric ulcer may even be more frequent than duodenal.

Acute ulcers of the stomach occur generally in the vicinity of the pylorus and are frequently multiple. They are small

ulcers and only exceptionally invade the musculature. Chronic gastric ulcers are much larger than the acute, are usually single; the great majority occur along the lesser curvature toward the pyloric end and as a rule invade the musculature. They may and sometimes are associated with acute ulcers.

*Perforation* is more likely to occur in the chronic type of ulcer and preferably in duodenal ulcers. Among Stewart's 150 gastric ulcers 58 had perforated, and in the 200 duodenal ulcers 122 had perforated. In both types the perforation occurs in the anterior wall in the vast majority. Only about 10 per cent of perforations are found in the posterior wall.

### ETIOLOGY AND PATHOGENESIS

It is not within the province of this short paper to discuss the etiology and pathogenesis of peptic ulcers. Suffice it to say that I agree with Smithies<sup>2</sup> that these ulcers are only local expressions of a systemic condition. Thus Nakamura of the Mayo Clinic<sup>3</sup> found that streptococci from certain foci (as in the tonsils) have an elective tendency to locate in the mucous membrane of the stomach and produce ulcers. The point is of importance in connection with treatment and prevention of recurrence.

### SYMPTOMS AND DIAGNOSIS

Every practitioner knows that, in the absence of complications, ulcer patients may carry their lesions for a long number of years with little or no distinctive symptomatology. They may even heal spontaneously. The old and long-cherished

idea that excess of hydrochloric acid in the stomach meant ulcer is not correct. Examination of the stomach contents will show hyperacidity in about 70 per cent of pyloric and juxtapyloric ulcers, but in ulcers of the body of the stomach there is more likelihood of normal acidity or even hypoacidity. Besides, not all patients with hyperacidity have gastric or duodenal ulcers. Smithies from his long experience thinks that the symptomatology which suggests ulcer may arise from other visceral or systemic disturbances, and that probably not more than half the patients now being treated non-surgically in hospitals for peptic ulcer are really suffering from that condition. About two-thirds of so-called ulcer patients have associated pathology, due especially to infections in the appendix or gall tract, such affections exerting a definite influence upon both gastric secretion and mobility. It is very often found that after an appendectomy or gall-bladder operation there is a disappearance of "ulcer" symptoms.

It is only when an ulcer has been established for a long time and causes the complications of very severe dyspepsia, hemorrhage, stenosis or perforation that the condition may be diagnosed with more or less certainty.

Of course an ulcer may spontaneously heal but one of the above sequelae is very much more likely; or there may be rarely a malignant degeneration, especially in gastric ulcer. Morley,<sup>4</sup> who has made a thorough investigation of this type of malignancy, says that although it cannot be denied that cancer may develop in the edge of a chronic gastric ulcer, or in some part of a stomach that is or has been afflicted by a chronic gastric ulcer, there is no evidence that the development of cancer on gastric ulcer occurs with anything like the frequency claimed by some authors. There is little more liability to cancer in an ulcerous than in a healthy stomach. On the other hand, genuine cancer of the stomach in a large proportion of cases gives rise to a symptomatology which simulates ulcer.

Hence the belief in cancerous degeneration of ulcer.

#### TREATMENT

*Medical.* It is generally conceded that in the earlier stages and in the absence of certain symptoms, which are clear indications for surgical treatment, both gastric and duodenal ulcers are amenable to medical treatment and that such will be effective if strictly applied for a sufficiently long period.

There are, however, great differences of opinion as to what constitutes a medical treatment. The old von Leube and Lenhardt dietetic treatments have to some extent been discarded in favor of the intense alkalization methods exemplified in the Sippy treatment. The principle of this and similar methods is to render the gastric contents permanently alkaline by frequent doses of alkalies, alternating with a diet rich in calories, given in small quantities. It is claimed that the acid secretion is lessened, pain relieved and healing of the ulcer promoted. Magnesium oxide, calcium carbonate and sodium bicarbonate are the neutralizing agents employed. The patients must be kept under strict supervision for a period of from six to twelve months.

Smithies<sup>2</sup> criticizes the Sippy alkaline method as only relieving symptomatology but not bringing about a cure. Overalkalinization produces a toxemia and does not lessen real acidity. Hardt's studies in the Mayo Clinic<sup>6</sup> showed that after intense alkalization the blood urea increased six times, blood carbonates doubled and creatinin increased more than 100 per cent. Other investigators have also referred to alkalization toxemia, and it appears that the full alkali treatment should not be attempted when there is any kidney defect or when there is partial pyloric obstruction present.

Smithies scoffs at the so-called cures of ulcer by the Sippy method and states<sup>5</sup> that about 50 per cent of his own ulcer patients had been under the Sippy treat-

ment one to three times and yet at operation, clinically, or by roentgen study, an active ulcer, gross deformity from ulcer scars, or malignant degeneration was shown to exist.

Smithies thinks it more logical to submit patients to physiological rest giving special nutrient enemas at first, followed by frequent fluid carbohydrates by mouth which rapidly pass through the stomach without irritation and invite jejunal digestion. Very little hydrochloric acid and pepsin are secreted after the stomach is at rest for a long time and the administration of large quantities of alkali is unnecessary and tends to increase acidity.

Smithies pays particular attention to the general state and diligently seeks for the primary systemic defect of which the peptic ulcer is only a particular manifestation. This must be rectified if recurrence of ulcer is not to be expected.

I may refer here to the method of duodenal feeding. It is claimed to be useful in duodenal and gastric ulcer of severe type associated with intense vomiting, nausea and recurring hemorrhage, especially rebellious to ordinary treatment. The method spares the stomach while healing of the ulcer occurs.

*Surgical Treatment.* When there is gross scar formation, frequent or severe hemorrhage, perforation, suspected malignant degeneration, or if the general symptoms do not improve after persistent medical treatment, the condition calls for surgical interference. There is just as much difference of opinion among surgeons as among internists in regard to the best mode of operative treatment.

Balfour of the Mayo Clinic<sup>7</sup> recommends cautery excision alone for small ulcers on the lesser curvature, adding a gastroenterostomy if the ulcer is distant from the pylorus. The mortality is 2.12 per cent and there are 90 per cent satisfactory results claimed. In the duodenum the indication for excision is not so strong as in the stomach as there is less liability to cancerous degeneration, but excision and

gastroenterostomy here gives 95 per cent satisfactory results.

The general technique of gastroenterostomy has been so much improved in late years that hemorrhage and vicious circle need no longer be feared. The operation has been made simple and safe in the hands of the average surgeon.

But according to C. H. Mayo<sup>8</sup> the tendency among surgeons at the present time is to get away from gastroenterostomy, and to go back to the resection of the upper part of duodenum and pyloric end of stomach as recommended by Billroth in 1881. This operation is not so easy nor as familiar to most surgeons as gastroenterostomy and Mayo thinks that the advocacy by von Haberer of extensive resection followed by gastroduodenal anastomosis has done great harm. For small duodenal ulcers with hemorrhage Mayo prefers a large flap gastroduodenostomy which is only half as extensive as a gastroenterostomy and which avoids gastrojejunal ulcer.

Of course resection still has its own special indications as in the case of very large ulcers of the lesser curvature.

A word may be said here in regard to the operative treatment of perforated ulcers, as there is much discussion whether a simple closure should suffice or whether this should be followed by gastroenterostomy. Those who oppose gastroenterostomy say that the perforation heals the ulcer, that the added operation adds to the mortality, that there is the danger of spreading infection in the peritoneal cavity, and that reperforation, hemorrhage and stenosis occur only exceptionally following the primary perforation. On the other hand gastroenterostomy is not always successful in relieving symptoms or preventing subsequent complications. The best opinions seem to justify closure alone if there is no infiltration surrounding the perforated area; if there is infiltration, and if the general condition of the patient permits, a gastroenterostomy should be done. In perforated ulcer the results seem

to depend less upon the type of surgical interference than upon early operation.

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### SURGICAL ESSENTIALS

Surgical technique stands in third place in importance among the essentials of good surgical practice. Many will fail to agree with me in placing such a small amount of importance on what they perhaps consider most essential, but experience has taught me that three months in the surgical laboratory will make a very clever technical manipulator from a young inexperienced girl who has the power of keen observation and is clever with her fingers; yet who would dare to assert that this individual is a surgeon! However, though I rate it below surgical diagnosis and surgical pathology, I would place an emphasis on certain phases of surgical technique

far greater than is usually done. Surely no individual not possessing a delicate sense of touch should attempt surgery. Repeatedly, in the process of training students, one observes failure on the part of one student and success on the part of another, even though both apparently went through the same maneuvers, the failure of the one being due solely to an intrinsic lack of delicacy of touch. This element is difficult to pick out in various individuals, but no one should contemplate entering surgery without questioning himself as to this ability.—RALPH H. CHANEY in *J. Med. Assn. Georgia*.



# THE ADVANTAGES OF EARLY OPERATION IN SURGERY OF THE BILIARY TRACT

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ALTHOUGH nearly all of the operative measures at the present time practiced in surgery of the biliary tract have been known and utilized for several decades past, nevertheless gallstone surgery has seen its greatest development during the last ten or fifteen years. In the beginning, all operations upon the gall bladder and bile ducts were formidable procedures, undertaken usually as a last resort; with increased experience in this field of surgery, and with refinements of technique, the mortality has been so reduced that operation upon the average case, in competent hands, now constitutes one of the safest and at the same time one of the most successful of major surgical procedures.

In spite of this, and in spite of the repeatedly demonstrated failure of internal medicine to effect any results other than palliation in cases of gallstones, numbers of patients are still not operated upon at the time when the chances for a successful result are the best. To present a plea for earlier surgery in these cases is the object of this paper.

It was formerly taught that by far the greater number of cases of gallstones occurred in women, usually in middle life. This view was based upon operative, and to an equal extent, upon post-mortem findings. Operations were not performed until the patient had had several severe attacks of colic, or until a stone became impacted in the common duct. However, as our methods of examination and diagnosis increased in number, scope and refinement, and particularly when operative exploration in obscure gastrointestinal conditions became more common, we were forced to revise our conception. Our gallstone cases

are no longer made up principally of obese, middle-aged multiparae. We now know that infection and calculus formation in the gall bladder may occur in childhood; cases are on record in which the first attacks of colic have appeared in the tenth and eleventh years; in which a girl of seventeen had a stone in the common duct; another eighteen-year-old patient had cholecystitis with pancreatic and disseminated fat necrosis; a youth of nineteen showed a purulent cholecystitis and pancreatic abscess. According to my own records, my youngest patient was a girl of eighteen, who had had two typical attacks of colic, and whose gall bladder, removed at operation, contained 342 stones; my oldest was a woman of eighty-two, who died following operation for spontaneous rupture of an empyematous gall bladder. Thus it may be said that no age is exempt, although it is unusual to find cases at the extremes of life. It still holds true that the preponderance of cases occurs in women, although by no means to the extent formerly believed.

The statement has been made, that gallstones may exist for an entire lifetime without giving rise to symptoms. This may possibly be true, in rare instances; I prefer to believe, however, that in such cases, symptoms very likely have been present at some time, but have not been characteristic, or that the diagnosis has been faulty.

Let us for a moment briefly review the pathological anatomy with which we are here concerned. I shall not attempt in this place to discuss the question of the formation of gallstones: suffice it to say that the modern view is that they are formed by a precipitation of bile salts, probably as

a result of infection of the gall bladder or its contents, or both. The gall bladder having become infected, or stones having formed, what are the results?

In the biliary system as a whole, we have present two significant physiological narrowings, one formed by the cystic duct, and the other by the junction of the terminal portion of the common duct with the papilla of Vater. Obstruction at either of these points may have serious and far-reaching results: a cavity with free drainage is converted into a closed one, and in this closed cavity the infecting organisms, which are always present, multiply very rapidly, at the same time increasing in virulence, thus giving rise to severe inflammatory changes, with their attendant consequences. The most common cause for obstruction is biliary calculi. These are found most frequently in the gall bladder, less often in the common duct and higher up in the deeper bile passages; very infrequently they are found in the latter alone. While stone formation may occasionally occur in the common duct, as a rule it takes place in the gall bladder, and most stones found in the common duct have originated in the gall bladder. A severe cholecystitis without calculi is very exceptional, although a mild degree of infection occasioning a so-called "catarrhal inflammation" undoubtedly precedes the actual stone formation for some time.

Obstruction of the cystic duct gives rise to a rapid increase in the intensity of the accompanying cholecystitis; the inflammation may extend to the omentum, and may not infrequently attack neighboring organs, giving rise to the dense adhesions so frequently found in long-standing cases. Destructive changes, ulceration, phlegmonous infiltration, or gangrene, in the wall of the gall bladder, just as in appendicitis, may occasion rupture of the viscus into the free peritoneal cavity, or if adhesions are present, into other organs; likewise, in the presence of adhesions, pericholecystic abscesses may be formed, which abscesses may secondarily rupture, leading

to dissemination of the infection in all possible ways. Empyema of the gall bladder results from closure of its duct with subsequent purulent infection of its contents; when pus formation is not present, and instead the gall bladder is filled with clear mucus, the condition is known as hydrops of the gall bladder; with repeated attacks of cholecystitis, if the cystic duct remains patent, the gall bladder becomes much shrunk and contracted. Finally, there is always present the possibility of carcinoma, from irritation occasioned by the constant presence of a calculus, or calculi.

As a result of closure of the common duct, there is a general slowing of the bile stream, with all its consequences: possibly general hepatitis, multiple liver abscesses and septicopyemia. Long-standing obstruction gives rise to great dilatation of the deeper bile passages; if no infection occurs, and bile secretion ceases, a clear mucus accumulates, the so-called "white bile." Such extensive dilatation of the common and hepatic ducts, giving rise to the so-called "idiopathic common duct cysts" may also occur after the passage of a stone, as a result of scar contraction following ulceration. A stone impacted in the ampulla adds chronic pancreatitis to the list of complications, and here again, as a result of chronic irritation, we have the ever-present danger of carcinoma.

From this brief survey, it is plain that infection of the biliary tract, particularly of the gall bladder, with its very frequent, almost usual sequel of gallstone formation, may have far-reaching and serious consequences. Likewise, to me at least, it seems clearly apparent and requiring no argument, that practically all of the conditions mentioned are to be relieved only by surgery. In these cases, we are dealing not alone with disturbed function and pathological physiology, but also, when gallstones are present, with a mechanical difficulty, and the latter requires mechanical methods for its correction.

Under such circumstances, what can

internal medicine do? It cannot dissolve the stone; while it is true that it can relieve attacks of colic, and by proper dietetic and hygienic management apparently prevent to some extent their frequent recurrence, this is far from attaining the goal of ideal treatment, namely, the removal of the underlying cause of the disease and the restoration of the organism to a condition as nearly approximating normal as is possible. It is also true that occasionally a gallstone or gallstones may be passed spontaneously while the patient is undergoing medical treatment, but in the vast majority of cases this certainly does not indicate a cure; it simply means that in all probability there are other stones remaining which will not be passed, and which will give rise to trouble in the future. With the exception of but one recently developed procedure, in which, furthermore, the field of usefulness is decidedly limited, internal medicine can offer nothing in the way of curative treatment for the conditions under discussion. The procedure to which I refer is, of course, the Lyon method of gall-bladder drainage. Opinion is still divided as to its value; I believe that in certain cases of cholecystitis, without gallstones, no harm is done by giving it a trial. Under such circumstances, however, the patient should be made to understand clearly that unless decided improvement is manifest within a reasonable length of time, resort must be had to surgery.

The inability of internal medicine successfully to cope with these various conditions, especially with repeated attacks of colic, has long been appreciated. With the development of aseptic surgery, therefore, and with the knowledge that by the employment of aseptic principles the abdomen might be safely opened, it is not surprising that very early attempts were made to attack gallstones surgically. The earliest of these attempts consisted in simply opening the gall bladder and removing the stones, followed by suture of the viscus and its replacement in the abdominal cavity, the ideal cholecystotomy of

Spencer Wells and Courvoisier. This operation is very seldom employed at the present day; it takes no account of the diseased condition of the gall-bladder wall, and in the light of our modern knowledge it is known that this factor must be considered in practically every case.

In 1878, Kocher reported his first case operated upon by his method of two-stage cholecystostomy; in this method, the gall bladder is sutured into the abdominal wall as the first stage, later being opened and drained as the second stage. This operation is now done in one stage, and the gall bladder is no longer sutured into the abdominal wall. The success of gall-bladder surgery was advanced materially when Langenbuch, in 1882, first removed the gall bladder and cystic duct.

As time passed and surgeons gradually became more familiar with this field of surgery, bolder and bolder attempts were made to reach calculi in the deeper bile passages, and stones were successfully removed from the common and hepatic ducts. Stones in the retroduodenal portion of the common duct, especially those impacted in the ampulla, formed the most difficult problem. Some were forced or "milked" back into the supraduodenal portion of the duct and removed, others were crushed in situ and the fragments washed into the duodenum (choledocholithotripsy), and in 1891 McBurney approached them from the duodenal side and performed the first transduodenal choledochotomy. Owing to technical difficulties, and to consequent increased danger attendant upon its performance, this operation in the beginning was not very extensively employed; with increased experience, however, these technical difficulties have been greatly reduced. Finally must be mentioned operations in which the gall bladder or common duct is anastomosed with the stomach or intestine, in order to get the bile into the latter in the presence of an obstruction in the common duct which cannot be removed.

From this brief sketch of the history of



gall-bladder surgery, it is apparent that practically all of the important procedures were devised early in the era of aseptic surgery. Later years have added nothing fundamentally different; progress has consisted only in developing and refining methods already known. Further development and refinement is desirable, if possible, in order that the present comparatively low mortality may be reduced still further; this is the task of the present generation of surgeons.

In addition, the task also devolves upon us of popularizing surgery of the biliary tract, if I may so express it. As we know, gall-bladder surgery today, in competent hands, is so highly developed that we may feel that we can completely and permanently cure most cases of gallstones, by means of operations which do not involve an extraordinary amount of risk, which are, in fact, quite safe. Under such circumstances, it is hard to understand why there still remains so much popular opposition to the great benefit which may be obtained from surgery in affections of the biliary tract, particularly when these affections are so widespread and the occasion of so much prolonged suffering. But the fact remains that this opposition exists. Patients at the present time are convinced as to the value of surgery in diseased conditions of the appendix, and no argument is necessary to make them submit to an operation, but how different the situation is when the pathological condition present is one involving the gall bladder or bile ducts! The mere mention of operation calls forth numerous objections, and all too frequently it is impossible to convince these patients that early operation is particularly desirable in these conditions, and that the earlier surgical treatment is undertaken, the better the prospects for a complete cure. The argument is often advanced that recurrences take place; occasionally, they certainly do, but more frequently, these so-called "recurrences" are due to stones which have been overlooked and left

behind at operation, and this simply means that too much care cannot be exercised to see that all stones present are removed. But aside from this, and admitting that a recurrence may once in a while take place, is this any reason for not urging operation? Do not recurrences take place in other conditions, for example, in kidney and bladder stones, in malignant growths, in goiters? But do we hesitate to recommend operation in these latter cases? And what is the average gall-bladder case treated medically but a continuous series of "recurrences"?

Of course, in advanced cases, with gallstones no longer confined to the gall bladder or even to the common duct, but with the entire biliary system, including the intrahepatic ducts, choked with calculi, then even the most technically complete operation will probably fail; or if a patient with a common-duct obstruction delays operation for a time, until he is deeply cholemic, with possibly a purulent cholangitis and multiple liver abscesses, certainly an operation is highly dangerous, and frequently contraindicated. But such cases are fortunately comparatively rare, and the conclusion to be drawn from them is, not that gallstone operations are dangerous, but that it is dangerous to wait. They form the strongest argument for early surgery that we have.

To repeat what has been said above, as surgeons it is our duty to reduce the already comparatively low mortality figures in these operations still lower, which, to a great extent, can be done only by earlier operation. By simplifying and perfecting the operative technique, and by being extremely careful in every case exhaustively to search for and remove all stones which may possibly be present, relapses or recurrences will become more infrequent, and we may confidently hope to approach much more closely to that ideal for which we are striving, and in so doing, attain the result which the patient expects, namely, the complete and permanent relief of the affliction from which he is suffering.

Naturally, all that has been said presupposes a correct diagnosis. An operation on the gall bladder will not cure if the patient is suffering from gastric ulcer or stone in the kidney. And such errors are readily avoidable in the vast majority of instances, provided that a proper study of the case has been made beforehand. This should always be done, and there is rarely any excuse for not doing it, since very few of the operations under discussion come to us as emergencies. The history of the case from the beginning should be very carefully taken; in addition to the direct examination of the patient by the ordinary methods of physical diagnosis, we have today a number of tests and procedures by means of which we can obtain valuable information about the condition of the liver and bile passages with a fair degree of accuracy, and we have the great aid afforded by the roentgen ray. All these measures should be utilized before operation is undertaken, and both the patient and the field of biliary surgery will be benefited as a result.

A discussion of the various operations upon the biliary tract does not come within the scope of this paper; suffice it to say that the surgeon who conscientiously undertakes gallstone surgery should be familiar with them all, since that method of procedure must be utilized which best meets

the condition found at operation. A great amount of discussion has taken place regarding the relative merits of cholecystostomy and cholecystectomy. It is my opinion that cholecystectomy is the operation of choice, provided that it can be performed without jeopardy to the patient. Except in emergencies, any operation is incomplete that does not include a complete exploration of the bile passages so far as is possible. Without this, stones are easily overlooked.

To the patient who has had one or two attacks of severe colic, in whom, after careful study, a diagnosis of gallstones has been made with reasonable certainty, and yet who is still reluctant to submit to operation, to such a patient the dangers of a really severe cholecystitis or of a long-continued common-duct obstruction should be pointed out, and early operation should be urged. A cholecystectomy in the beginning of an attack of acute cholecystitis is a comparatively simple and safe procedure, consequently early operation is indicated here. In a case of common-duct obstruction, the prognosis becomes more doubtful the longer the obstruction persists; consequently early operation is again indicated under such circumstances. In general, it may be said that at every stage, the earlier the operation, the better the result.



# ADVANTAGES OF THE LEFT "STANCE" IN THE OPERATION OF APPENDECTOMY

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WHEN the right rectus or paramedial incision is used in an appendectomy, six or more advantages accrue to the surgeon who operates standing on the left side of the patient. Especially do these advantages appear in the exploration of a doubtful abdomen with appendicitis as the most likely lesion.

1. The chief and important advantage is that, when the right side of the incisional wound is elevated or retracted, the surgeon can obtain a better view of the region of the appendix if he is looking from the left rather than the right side of the patient. From the same direction the right tube and ovary are more readily seen. The whole right iliac and right pelvic regions can thus be viewed with the viscera in their relative positions and without disturbing the diseased viscera as is so often done by pulling out the reluctant cecum. From the right side the cecum is often tugged, wrestled and rolled around a corner, the edge of the rectus muscle. From the left side the appendix can more often be sighted on the intestinal billows and picked up alone, or the cecum can be drawn carefully directly toward the operator, with no obstacle in the way.

2. Less elevation and less retraction of the rectus muscle and underlying vessels are necessary. These tissues are less likely to be traumatized by retracting them toward the right side. Thrombosis is less likely to occur.

3. The operator can see better to deal

with subrectus vessels that often, when bleeding, are hidden under the outer half of the rectus muscle.

4. An assistant on the right side, where a retractor is needed, can there retract more conveniently and thus more gently. He is out of the way of the operator.

5. The surgeon can see better from the left side to make a stab drainage wound in the right flank.

6. If the incision needs to be extended upward for exploration, the dissection is more safely and conveniently done with the right hand, while the left hand in the abdominal cavity furnishes protection to the pouting viscera. Subsequently the gall bladder can be seen better and the common duct can be palpated better from the left side.

After the condition of the appendix and other viscera has been visualized, if the operator desires he can shift to the right. However, the technique of removing the ordinary appendix hardly requires so much consideration. The exploration and diagnosis are the essential part of the operation.

The first operations for appendicitis were performed through McBurney incisions which necessitated for the operator a position on the patient's right. This early precedent seems to have established a habit from which there has been no deviation, although the natural, convenient and advantageous position for the surgeon using a right rectus incision, is on the left of the patient.



# DANGERS IN THE USE OF ALUMINUM ACETATE SOLUTION AS A WET DRESSING

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THE comment has been made by Brickner<sup>1</sup> that "Many physicians prescribe liquor alumini acetatis and Burow's solution on all occasions for bruises, cuts and skin infections. These quite similar preparations are good as a wet dressing under suitable conditions; but if either is improperly prepared or

A farmer, aged forty years, had an infection in his finger that extended only to the subcutaneous tissue. The area was incised by one of my assistants and a solution of aluminum acetate, 30 grains to a pint of water, was applied. My attention was not again called to the hand for more than a week. At that time the skin on the dorsal surface, particularly over the knuckles, was badly macerated. The



FIG. 1.

insufficiently diluted it may cause a violent dermatitis. For home use, especially, it is better to order the much blander boric acid solution."

Surgeons and dermatologists very commonly use a solution of aluminum acetate as a wet dressing for inflammations more or less superficial. That this practice was a more or less harmless one I took for granted until an experience several years ago taught me differently.

<sup>1</sup>Surgical Suggestions. AM. J. SURG., Feb., 1927, n.s., ii, 161.

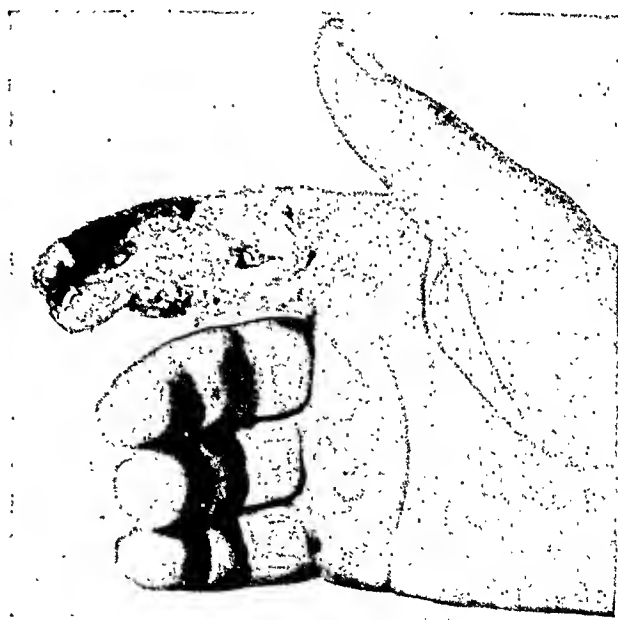


FIG. 2.

distal portion of the index finger was black as far as the base of the second phalanx (Fig. 1.) Amputation was done at the metacarpophalangeal joint.

The extensively macerated skin covering the knuckles healed without disturbance of function (Fig. 2).

Microscopic examination of the amputated finger showed an endarteritis and a complete thrombosis of the veins. It was evidently the occlusion of the veins that brought about the

death of the finger. The tissues showed but little leucocytic infiltration.

Reference to the photograph will convince one that the patient was fortunate to escape with the loss of one finger.

In searching through the literature I find in the small monograph on "Das Panaritium" by R. Klapp and H. Beek,<sup>2</sup> the same condition illustrated.

<sup>2</sup> Leipzig, 1923, Pl. vi.

No doubt much mischief is done by the too prolonged use of aluminum acetate even when it stops far short of producing necrosis. Generally speaking, all will be accomplished in twenty-four hours that can be accomplished with this drug and, when prescribed, a limitation should be placed on its use. The same general rule is applicable to any wet dressing.

#### [SURGICAL SUGGESTIONS]

SOME cases of pain in the arm, especially those with paresthesias in the ulnar nerve distribution, are due to dragging of the brachial plexus over the first rib. They are relieved by elevating the shoulder and by exercising the trapezius to keep it elevated.

THE characteristic cervical rib syndrome is that of pressure on the lower trunk of the brachial plexus, viz., pain, paresthesia or anesthesia along the ulnar border of the forearm and hand, atrophy of the ulnar-nerve-supplied hand muscles, etc. All the phenomena of pressure by a cervical rib may be produced by the pressure of an abnormal or even a normal first thoracic rib. Several cases have been cured by resection of the first rib.

WHEN operating upon a case of cervical rib it is important to observe whether the pressure to be relieved is due to this supernumerary, or to the normal first, rib.



# SURGICAL DIATHERMY IN THE REMOVAL OF HEMORRHOIDS

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MANY individuals with hemorrhoids do not go to a surgeon because they fear an operation which they have heard is painful. Some of these individuals, though suffering great distress for a period of years, steadfastly refuse to permit the use of the scalpel or scissors. For these, a procedure may be employed which results in complete removal of the hemorrhoidal tissue, but which meets many of their objections.

This method is based upon the destructive action of the high frequency electric current when applied in concentrated form to animal tissue. This action may be a coagulating or desiccating one. Microscopical sections of tissue treated with these currents showed that: "The cells submitted to desiccation treatment were shrunk and shrivelled, and their nuclei condensed and elongated with a suggestion of cell outline, the whole assuming a mummified appearance. The blood vessels were thrombosed, and there were evidences of hemorrhage. In the case of coagulation, the cell outline was entirely lost, the affected tissue elements fused into a structureless homogeneous mass representing an appearance not unlike that of hyalinisation."<sup>1</sup>

The use of the high frequency current in hemorrhoidectomy permits the surgeon to mollify the fears of the timorous patient who refuses the usual surgical operations. The hemorrhoid may be removed under local anesthesia in the doctor's office, and the patient permitted to go home afterwards. This removes the dread of hospitalization. No blood is lost during the

<sup>1</sup> Clark, W. L., Morgan, J. D., and Asnis, E. J. Electrothermic methods in the treatment of neoplastic and other lesions with clinical and histological observations. *Radiology*, 1924, ii, 233-246.

operation. Infection does not occur at the time of operation, inasmuch as the operation itself is a sterilizing procedure, the heat generated being sufficient to destroy microorganisms as well as body cells. The occurrence of embolism is precluded by the fact that there are no clots or loose tissue left in the blood vessels to be taken up by the blood stream and swept to some other part of the body. The lymphatic and blood-vessel ends are sealed by the treatment. With proper anesthetization, no pain is experienced during the operation. The amount of postoperative distress varies with the extent of the involved area, the sensitiveness of the patient, etc., but, in general, appears to be much less than that following the usual surgical removal. It is not necessary to use a rectal tube, or to confine the bowels by a constipating diet.

The removal of hemorrhoidal tissue by means of electrodesiccation or electrocoagulation is just as complete as by the use of the scalpel. Tissue destroyed by means of a current of high voltage and high frequency is just as dead as if it had been cut away from the body by means of the knife. The extent of the area destroyed and therefore the completeness of the removal of the hemorrhoidal tissue depend upon the operator, whether he employs the scalpel or the electric current. Very frequently, in addition to the larger hemorrhoids there are small varicose areas which cannot readily be excised, ligated, or removed by the clamp and cautery, but which can very easily be destroyed by means of the pointed electrode used in surgical diathermy. It is these small varicose areas which may subsequently develop into

larger hemorrhoids, which the patient interprets as "recurrences."

*Preparation for Operation.* Preparation for the operation on the part of the patient consists of emptying the bowels by means of an enema, and avoiding food for a short time before. Local anesthesia may be secured by perianal or sacral injection.

*Apparatus.* A well-balanced, resonant diathermy machine is employed. For the destruction of the small varicose areas, a pointed metal electrode in an insulated holder is used. By means of it, either

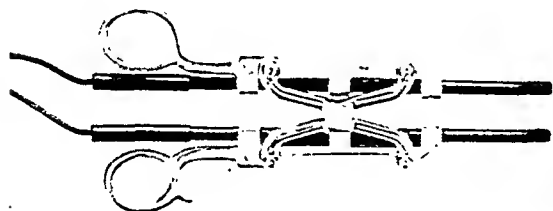


FIG. 1.

the monopolar (Oudin) or bipolar (d'Arsonval) type of current may be applied. If the d'Arsonval current is to be used, this electrode is connected to one pole of the machine, and a large indifferent electrode is connected to the other. This indifferent electrode may be made of block tin. A convenient size is 6 by 8 inches.

It is thoroughly covered with soap lather and placed on some convenient area of the body, as the lower part of the back. In this position the weight of the patient's body, as he lies on the table, holds the plate in firm contact with the skin.

If the Oudin current is to be employed, the active electrode is connected directly with the Oudin terminal of the machine, and no other connection is needed.

With both currents a foot switch is a great convenience, permitting the current to be turned on or off as the operator desires without the necessity of using his hands for the purpose.

The exact amount of current to be used should first be determined by testing the effect of varying amounts of current on a piece of raw meat. Note should be taken

not only of the amount of current used, as determined by the settings on the machine (and in the case of the d'Arsonval current by the readings on the hot-wire milliamperemeter), but also of the size of the active electrode and the time during which the current is applied. Cross sections are then made through the treated areas to determine the extent of the action of the current. By this means, the amount of current to be used on the hemorrhoidal tissue can be determined. The change in color of the tissue as it becomes coagulated



FIG. 2.

or desiccated will indicate the surface extent of the treated area.

For the destruction of the larger hemorrhoidal masses, this method (employing a pointed metal electrode) is not satisfactory for several reasons:

1. The destroyed mass decays and becomes malodorous. It offends the olfactory sense until it sloughs off, ten days to two weeks after the operation.
2. The dead mass acts like a foreign body, causing a mechanical irritation.
3. The exact depth to which the tissue is destroyed cannot be definitely determined.

When a rapidly oscillating current is passed through the tissues its electrical energy is converted into heat. The amount of heat formed in tissue varies directly as the square of the current passed. Increasing the amount of current will increase the temperature of a given area, provided that the heat is held concentrated in that area. With living tissue this is impossible, as the blood stream has a marked heat-dispelling



effect. Hence the increase in the temperature of the treated part is not in exact accord with the above physical law.

The heat developed in the tissues by the high frequency current varies directly as the resistance of the tissues through which it passes. Inasmuch as with the usual technique there are many different types of tissue of different electrical resistances lying between the electrodes, this physical law is difficult of exact application.

Thus the exact depth of the destroyed area is dependent upon several variable

The action of the electrosurgical hemorrhoid clamp is in no way comparable to that of the ordinary surgical clamp used in the clamp and cautery method. The ordinary surgical clamp compresses the tissue at the base of the hemorrhoid, insuring hemostasis when the tissue beyond it is removed. The electric clamp has only very slight compressing action, being so constructed that its jaws are separated where they are applied against the hemorrhoid. The very purpose of this separation is to prevent the hemorrhoidal tissues being com-

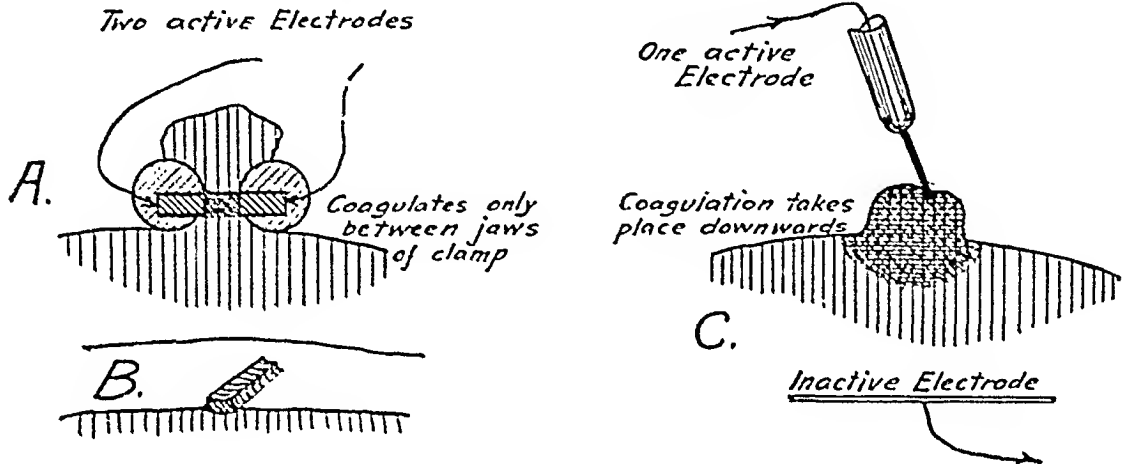


FIG. 3.

factors: the size of the active and of the indifferent electrode, the amount of current used (its voltage and its amperage) and the resistance of the particular tissues to the passage of the electric current.

To obviate the difficulty of applying these physical laws in hemorrhoidectomy by means of the high frequency current, I have devised a clamp which consists essentially of two equally active electrodes held parallel and properly insulated so as to protect the operator.

The advantage in the use of two active electrodes lies in the fact that the path of the destroyed area can be exactly determined, lying as it does in the plane of the active electrodes, which are held parallel to each other. This obviates the danger of destroying too much or too little tissue. The uncertainty as to the depth of the destructive effect of the current is removed. The area is destroyed exactly as desired.

pressed tightly, thus insuring a broad base which can be coagulated by the action of the electrical current. In the usual clamp and cautery operation, an artificial tuck of skin, of mucous membrane, or of both, is made, and the tissue removed along a very thin linear area. This area is then seared over with actual cautery. What happens therefore is a superficial carbonization of tissue over a thin line. With this technique, the occurrence of secondary hemorrhages may be explained by the tendency of the adjacent remaining tissue, which has thus been artificially tucked, to pull apart, the glueing action of the thin and superficial carbonized area being insufficient to hold it together. With the use of the electrosurgical hemorrhoid clamp, the destructive action actually occurs *within* the tissues embraced by the clamp. The resistance of the tissue to the passage of the electric current of high frequency, which is travers-

ing it between the two active electrodes on either side, causes the development of heat sufficient to coagulate it. The destroyed area thus has sufficient width and depth to hold the healthy ends of tissue firmly together and thoroughly to cover the healthy tissue underneath.

*Operative Technique.*<sup>1</sup> After anesthesia has been instituted, the hemorrhoid, whether it be internal or external, is grasped by means of an Allis clamp and is held stretched while the jaws of the electric clamp are approximated to its base. The current is then turned on by means of a foot switch.

The hemorrhoid becomes coagulated across its base. It is then cut off above the coagulated area by means of scissors, scalpel, or the high frequency cutting cur-

rent. The high frequency cutting current does not of itself have a sufficient coagulating or desiccating effect to permit it to be used alone in the removal of hemorrhoids.

During the two weeks or so before the coagulated area separates off, the healthy tissue surrounding it is preparing to act as a new covering surface, so that when it does separate off, the clean wound that is left heals over with great rapidity.

*Postoperative Treatment.* The after-treatment of patients operated on for hemorrhoids by means of the high frequency current consists preferably of rest in bed for a few days, depending on the amount of discomfort, and the application of some soothing ointment such as butesin pierate. If there is much discomfort, it is advisable to use hot compresses of magnesium sulphate solution and, if necessary, suppositories containing opiates.

<sup>1</sup>Full technique is described in *J. Industrial Hygiene*, Jan., 1927, ix, No. 1.

## ABDOMINAL EMERGENCIES

The diagnosis of acute abdominal disorders which demand prompt surgical intervention presents an interesting and fascinating problem to the medical mind. No other field of medicine throws the doctor so completely back upon his own resources, those resources which dwell within himself and are manifested by the exercise of his special senses and reason. In these days of elaborate laboratory diagnoses, when all the facilities of modern science in its many ramifications are called into play, it is rather exhilarating to throw away all outside aids, all so-called exact methods and instruments of precision, to

grapple with the problem unaided and strive to deduce its correct solution by the proper arrangement of facts obtained by one's own observations, and correlated by one's own experiences. We are no longer interpreting chemical reactions, reading instrumental findings, or puzzling over photographic films, but we are noting nature's reaction to abnormal stimuli within the human body—reactions which, although they may be constant, are so influenced by individual conditions and multiplicity of contributing factors that each diagnosis is an independent entity.—JOHN M. BIRNIE in *Boston M. and S. J.*



# THE TREATMENT OF HEMORRHOIDS

## BY DILATATION AND INJECTION

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WHEN the diagnosis of a purely hemorrhoidal disease is established, the type of surgical measures for relief must be considered, because no given procedure is best suited to all conditions.

It is neither necessary nor profitable to discuss the many operative measures that have been advocated for the cure of internal hemorrhoids.

A number of them are obsolete and others are ineffectual. I hold, however, that the following procedures will suffice in all cases and the effort is made to indicate the type of operation best suited to certain hemorrhoidal conditions.

### DILATATION OF THE ANAL SPHINCTERS

In the early stages of hemorrhoids, when there is only dilatation and varicosity of the vessels, and also in the acute hemorrhoids developing during pregnancy, relaxing of the sphincters is often a beneficial measure. Where the tumors are small and within the sphincter grasp, thus occasioning pain and tenesmus, much immediate relief comes from dilatation followed by cold injections and the regulation of the diet. However, I feel this valuable treatment is often misused.

If the sphincters are very irritable it may be advisable at the first treatment to distend the fibers to only 1 inch and then at each subsequent session to increase the amount of distention, the object being to stretch the muscle speedily to a diameter considerably larger than is ever produced by a fecal mass, which in the natural evacuation of the bowels is relatively slight.

In old cases where the sphincter is relaxed and the hemorrhoids prolapse with each bowel movement, coughing, sneezing

or stooping, where it is evident there is already a lack of muscle contractility, it would be folly further to stretch the sphincter fibers. In such a case, the tumor must be removed and the sphincter restored.

Stretching the sphincter forms an important step in the treatment of many rectal diseases, because it produces certain anatomical changes and definite physiological results. Stretching the muscle also stretches the fine nerve filaments in its substance and produces paralysis of these fine twigs. The result is the same as is produced when stretching the sciatic nerve. Localized inflammatory products are broken up, and as a result sphincteric spasm, pruritis and hypersensitiveness are mechanically relieved. In many instances pent-up secretions are thus provided free drainage.

If the traumatism is limited to the nerve branches in and about the sphincter, the regeneration of the nerve soon occurs and the paralysis is only temporary. If, however, the larger nerve trunks are injured, regeneration is more remote and it is possible for cicatrization and atrophy to occur in the muscle before new nerve tissue is built up, so that more or less permanent paralysis will result as a consequence.

A digital examination must precede every instrumental examination or dilatation, because it furnishes the examiner precise information regarding the tone, or contractile power, of the sphincter.

If the finger can be introduced into the patient's rectum easily and without feeling the "bite" or spasm of the sphincter, one must be very chary about introducing a speculum and dilating the anal canal,

because what little contractile power is present may be easily dissipated and a permanent partial or complete paralysis result.

The following case is an example:

A woman, aged twenty-six years, was delivered instrumentally of a large boy. The perineum was ruptured but was promptly repaired, the patient recovered and enjoyed good health, having complete control of the bowels. Four years later she was operated upon for hemorrhoids, and since that operation has had complete paralysis. The surgeon who operated informed me that he was positive no undue traumatism was used.

This case is mentioned to show that where the nerve supply of the sphincters has been previously injured an instrumental dilatation may be fatal to good results and therefore a previous digital examination is always indispensable.

Dilatation is not curative of prolapsing hemorrhoids, but as a preliminary step to more radical procedures it is very valuable in rendering the interior more accessible and to lessen the after-suffering of the patient. In the early stages of hemorrhoidal disease and in the inoperable cases, the careful, gradual relaxation of the sphincters and cold water douches and enemas will do much to make the individual comfortable.

#### INJECTION TREATMENT OF HEMORRHOIDS

This method is sometimes referred to as the "American system," or again as the "absorbing treatment." It originated with Mitchell of Clinton, Illinois, in 1871, and for many years was used promiscuously by ignorant and irresponsible charlatans who still exploit it as the "no-knife treatment." A great deal has been said pro and con the efficacy and value of this plan of treatment.

There are many individuals who go on year after year enduring pains and inconvenience at the anus because of their dislike or distrust of surgical measures. We have also found this method par-

ticularly satisfactory in tuberculous and in aged subjects.

In young and active persons the injection treatment is limited to the chronic internal hemorrhoids in which the predominating symptom is bleeding or protrusion or both. When the hemorrhoids are inflamed, with irritable and tightly contracted sphincter muscles, a radical removal is indicated. Such a condition usually is the result of a submucous or subcutaneous infection which requires incision and drainage, as well as removal of the hemorrhoids, to bring about a complete cure.

It is also a waste of time to remove the hemorrhoids by ambulatory measures and then put the patient to bed for the relief of fissure, fistula or other surgical complications; although hypertrophied papillae, skin tags or polypi may be removed under local anesthesia and thus in no way jeopardize the ambulatory treatment of the hemorrhoids. Terrell<sup>1</sup> estimates that about 70 per cent of the cases of hemorrhoids are amenable to office treatment.

*Methods of Injection Treatment.* There are two methods of treating hemorrhoids by injection. The first is to inject into the pile a sufficient quantity of a caustic solution to cause the tumor to slough away, thus leaving an ulcer to heal by granulation. This method was formerly most used but was largely responsible for those complications that brought the treatment into disrepute with the profession.

The second method comprises the injection of a small quantity of a weak solution, sufficient only to set up irritation and plastic exudation. This obstructs the circulation and produces a thrombophlebitis, causing shrinkage and atrophy of the pile without slough and ulceration. This method affords the maximum of good results with a minimum of complications. When carefully performed in selected cases the results compare favorably with the best of other treatments.

<sup>1</sup> Terrell, E. H. My present views of quinin and urea in the treatment of internal hemorrhoids. *Am. J. Surg.*, 1921, xxxv, 382.

The injection is applicable only to uncomplicated internal hemorrhoids that can be replaced and retained in case of prolapse. It can be practiced in all cases in which the rectal speculum can be introduced. External and thrombotic hemorrhoids, or acutely inflamed internal piles, must not be treated by this method. Most of the untoward results following this treatment arise from its use in inappropriate cases.

Many different drugs in various combinations have been experimented with,

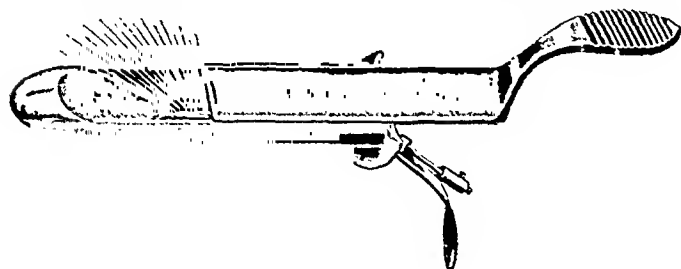


FIG. 1.

but carbolic acid, which was the active ingredient in the original formula, retains its reputation as a most effective agent. Dissolved in water, glycerine, or a bland vegetable oil, in strength varying from 10 per cent to 25 per cent, it may be used alone or in combination with salicylic acid, lead acetate, zinc chloride, ergot or hamamelis. The antiseptic, anesthetic and caustic properties of phenol render it particularly applicable for this purpose.

More recently the use of quinine and urea hydrochloride in 5 per cent strength has been brought into prominence by Terrell. Boas<sup>1</sup> advocates 96 per cent carbolyzed alcohol. My personal preference is for the following:

R. Phenol (crystals).....	oz. $\frac{1}{2}$
Zinc chloride.....	grs. 6
Olive oil.....	oz. 4

I have found that combinations containing glycerine diffuse more readily than those made with olive oil and hence tend to spread out beyond the hemorrhoid.

<sup>1</sup> Boas, 1. Ueber die Heilung der Hämorrhoiden auf unblutigem Wege und deren Resultate. *Arch. f. Verdauungskr.*, Berl., 1920, xxvi, 1-18.

*Technique.* The technique is not difficult, but requires some experience to secure the best results and to avoid the unpleasant complications that sometimes arise.

When it has been determined that the patient's condition indicates the use of this method of treatment, the procedure is as follows: On the day previous to the operation the bowel is thoroughly evacuated and four hours before the treatment a careful irrigation is given to clean out the pelvic bowel.

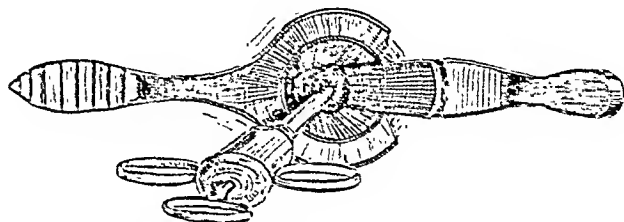


FIG. 2.

The patient lies on his left side on a firm couch or table, preferably at least 30 inches high. The thighs are fully flexed and the perineum is exposed in a good light.

A medium-sized conical anoscope of the Brinkerhoff type (Fig. 1) provides the best longitudinal view of the hemorrhoid, thus permitting an accurate placing of the solution. The anoscope is warmed, well ointed with vaseline, introduced into the anal canal and rotated until the desired hemorrhoid presents through the opening. Sometimes the patient can cause the hemorrhoid to protrude by straining and in such a case the pile may be treated while prolapsed.

Boas delivers all hemorrhoids outside the anus for diagnosis and treatment. This he says can usually be accomplished by straining; if not, an enema of hot salt solution or glycerine will often answer the purpose. Aspiration with a Bier vacuum glass has always proved the best means for drawing out the hemorrhoids. The aspiration is continued, under local anesthesia, until the nodules are distended to the utmost and until they do not collapse when the cupping is lifted.

In those cases where the pile is treated

in situ it is engaged in the fenestrum of the speculum. The slide of the speculum is withdrawn only sufficiently to let the tumor protrude through the opening. (Fig. 2.) The pile is now cleansed by swabbing with an antiseptic (my preference is for 50 per cent alcohol).

My hemorrhoid syringe (Fig. 3) now punctures the pile at about its middle and is advanced to about the center of the hemorrhoid, where 5 minims of the solution are slowly instilled until the tumor distends and blanches. The amount of solution necessary for each pile will vary, a large one may require upwards of 20

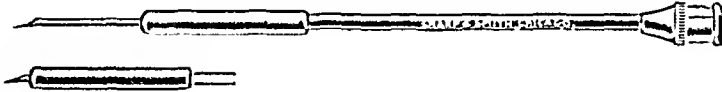


FIG. 3.

minims to distend and blanch the whole tumor; but caution must be exercised that too much solution is not used. Only enough solution is used gently to distend or balloon up the pile. As the tumor blanches the needle is permitted to remain in situ for a few minutes until the solution diffuses and coagulates, thus preventing escape of the fluid injected. The needle is then rotated a few times and withdrawn.

The puncture wound is immediately covered with a pledget wet with alcohol to prevent the solution from escaping and to neutralize any carbolic acid that may get out of the surface of the mucous membrane. The tumor, if prolapsed, is now replaced above the sphincter. The whole anal canal is then well covered with sterile petrolatum or astringent ointment.

A hemorrhoid may usually be fully injected from one puncture, but in very large or vascular piles it is advisable to deposit a few drops of the solution in two or three different locations. This may be done by only partially withdrawing the needle and then advancing it in another direction. If but two or three medium-sized piles are found they may all be injected at the one sitting, but if they are large but one should be treated. There is

no need to attempt too much at one time because the others may be treated while dressing those first injected. If the technique is correct, the solution properly placed and given slowly, there should be no pain. If the introduction of the needle causes a twinge it should be withdrawn immediately and another site chosen farther up.

*Results and After-Treatment.* Following the injection the hemorrhoids swell up considerably. If they have been injected while prolapsed they must be smeared with vaseline and carefully and immediately placed above the sphincter. Even in this situation

there is a feeling of weight and fullness in the rectum. This usually comes on a few minutes after the treatment and lasts for not over an hour, and the patient should remain recumbent to allow this rectal excitement to subside before he is dismissed from the office. Further than this there should be no discomfort or inconvenience from the treatment and the patient may go about his business as usual.

The patient should be advised of the possibility of the injected hemorrhoid prolapsing during the first twenty-four hours, and also be warned against straining or walking about. Should the injected pile come out it should be replaced at once by gentle pressure with soft paper or gauze well covered with astringent ointment.

If several hemorrhoids have been treated at one sitting it is best that the bowels do not move for at least two days. Afterwards they should be moved each day by a gentle laxative such as the following:

- R. Magnesii sulph.  
 Magnesii carb.  
 Sulphur precipitat.  
 Sacch. lactis..... aa  
 Pulv. anis  
 M. et sig. One or two teaspoonfuls in  
 water at night.

After the daily evacuations have been begun with the laxative the cold water enemas should be used each day. The diet should be largely of fresh fruit and vegetables, with the avoidance of alcohol, condiments and tobacco.

Following the injection the pile becomes grayish in color and on digital examination feels hard and fibrous, not unlike a polypus, but it soon begins to shrivel and in three or four weeks will have disappeared, leaving the mucosa quite normal to the touch. The whole healing process in the rectum is scarcely noticed by the patient.

Three days after the first treatment a second group of piles may be injected. This is continued until no piles are demonstrable through the speculum.

Relief of bleeding and prolapse is noted after the first treatment and many patients feel cured after four or five treatments, but as long as piles can be found through the speculum they must be injected or eventually they will trouble the patient.

If one treatment fails entirely to eradicate the hemorrhoid, it may be injected a second time after the reaction has subsided.

There appears to be a tendency for other veins of the anal canal to become varicose when the supporting pressure of the piles is removed, and by seeing the patient from time to time one can inject these as they show in the speculum, and before they give rise to symptoms. I, therefore, like to keep the patient under observation for a year, seeing him every two or three months.

Most sufferers from hemorrhoids complain of constipation. It is remarkable how this disappears with the piles; indeed, it is quite exceptional for it not to. I ask patients to leave off all purgatives.

*Complications.* Untoward effects very occasionally following an injection are:

1. Pain. This may result from (a) injecting an inflamed pile. This should be avoided and no injection given until inflammation has subsided. (b) Injecting a prolapsed pile and either not returning it into the rectum or allowing it to prolapse again and become strangulated.

The patient should take some care to keep a prolapsing pile up for twelve hours after its injection. After a few injections, often after the first, this tendency to prolapse will cease. (c) Injecting too low in the anal canal, where the latter is supplied with nerves from the perineum. It is well to start injecting high up and gradually to work downward, leaving the lower inch of the anal canal till the end of the treatment. By so doing that part will probably require no injection at all. (d) Depositing the injection too deeply in the pile and thus involving the muscular coat of the bowel.

2. Sloughing. It is important carefully to place the needle in the center of the pile before injecting the tumor. If the solution is deposited too near the surface, the mucosa will slough and ulceration follow. On the other hand, if the needle is carried into the muscular coat of the bowel, inflammatory reaction, abscess and perhaps extensive sloughing may follow. Also the solution must be cautiously injected lest the pile be over-distended. The sloughs are usually small but are very unfortunate, inasmuch as sometimes the process cannot be controlled and severe infection or secondary hemorrhage may result.

3. Urinary irritation. This may result from injecting in too close proximity to the urethra or prostate. It is not usually severe and passes off in an hour or two.

*Advantages of Injection Treatment.* The advantages of this procedure are:

1. The technique may be carried out in the office.

2. No anesthetic is needed.

3. Postoperative discomfort is very slight.

4. There is no confinement to bed; the patient can immediately get about his ordinary duties.

5. There is no danger of stricture or incontinence. The sphincter is not even dilated.

6. The results are as satisfactory in the severest as in the mildest cases.

7. In selected cases the certainty and permanence of the cure is almost absolute,



but a thorough knowledge of the rectal anatomy and its diseases is essential if one expects uniformly good results. Most important of all is a realization of the class of cases to which it is suited and its limitations. No one should attempt this treatment until he has thoroughly grasped these principles and knows what tissues to avoid and what symptoms to expect.

*Idiosyncrasy for Drug.* The possibility of an idiosyncrasy on the part of the patient must always be borne in mind when using a potent drug, and phenol is

no exception although we have had no difficulty in its use up to the present time.

Terrell in eight years' experience, in which he had used quinine and urea hydrochloride many thousands of times, has had no alarming effects that could in any way be attributed to the drug. He found three patients with some idiosyncrasy to quinine. Collier Martin, however, has reported one case in which very alarming symptoms followed the injection of quinine and urea hydrochloride into a hemorrhoid.

#### [SURGICAL SUGGESTIONS]

MULTIPLE masses in the breast are rarely malignant and usually bespeak an involutional mastitis, often cystic. They are often bilateral.

EVEN an isolated mass in the breast, especially if elastic, may prove on aspiration to be only an innocent cyst. Disappearance of the mass, partially or wholly, by the escape of the fluid through a needle, justifies the surgeon in assuring his patient that the tumor is not malignant. Moreover, a single puncture is often curative.

THE discharge at the nipple of a thick, cheesy secretion usually means that an associated breast tumor is not malignant.



# PERFORATION PERITONITIS WITH LARGE ENCYSTED GALLSTONE IN RIGHT NEPHRIC SPACE

## REPORT OF A CASE

NATHAN BLAUSTEIN, M.D.

NEW YORK

### INTRODUCTION

**P**ERFORATION of the gall bladder or the bile ducts must always be serious, on account of an escape of the visceral contents into the peritoneal cavity; the danger depending, however, on two factors: first, the nature of the extravasated fluid, and second, the time elapsed before surgical relief is afforded.

The presence of healthy bile in the peritoneum due to an injury such as a stab, a bullet wound, or a blow in a healthy individual, may be tolerated for some time without serious damage. It is of far more serious moment when the extravasated bile is pathological as it usually is where there is distention of the gall bladder or any disease of the bile ducts; for in such cases the bile is infectious and rapidly sets up a diffuse peritonitis, which, unless speedily operated on, ends fatally. If, however, the diagnosis be made at once and early operation is done, the prognosis is good.

In rupture of the gall bladder from sudden pressure induced by straining at stool, vomiting, sneezing, efforts in parturition, or even by blows over the hepatic region, there is, in all probability, in the greater number of cases a predisposition to rupture from thinning by ulceration or by long-continued distention, otherwise the accident would be much more common. Usually perforation occurs slowly.

It is highly dangerous to permit patients with distended gall bladders to go without operation even though symptoms be only occasionally present. A careful operation

in these cases is almost devoid of risk, but rupture is hazardous in the extreme.

### INCIDENCE

Bile peritonitis occurs under various conditions, among which must be included contusions of the abdomen with or without previous disease of the liver and larger bile channels, lacerations of the biliary tract through incised wounds of the abdomen, and, finally, both acute and chronic inflammations of the bile channels, obstructive and non-obstructive. In this paper, bile peritonitis will be considered only as resulting from perforation of the gall bladder following a long-standing cholecystitis with cholelithiasis.

McWilliams (1912) collected 108 reports of operations where spontaneous perforation of the gall bladder or extrahepatic ducts had occurred after long-standing inflammatory disease with resulting peritonitis in all. This finding is sharply at variance with the usual result in infections of the gall bladder, namely, local adhesions with a circumscribed pericholecystic abscess in which the gall bladder undergoes necrosis. McWilliams reviewed a total of 3180 operations on the biliary tract where perforation was encountered in twenty-nine (0.9 per cent). Karullon's figures from an analysis of 6114 consecutive autopsies are somewhat higher. He found gallstones 572 times with perforations of the gall bladder in three instances (1.5 per cent). His findings are contrary to the generally accepted idea that the gall bladder is the most common site of perforation.

From the above analysis it would seem that perforation of some portion of the biliary system into the peritoneal cavity occurs approximately once in every 100 cases of infection of the tract where the bile flow encounters obstruction. It is, however, a lamentable fact that surgical textbooks tend to minimize the possibility in the mind of the reader.

#### SIGNS AND SYMPTOMS

The symptoms of perforation of the bile passages are those of the perforative peritonitis from other causes, but there will usually have been premonitory symptoms pointing to the origin of the disease.

1. *Pain.* A sudden pain beneath the right ribs, and collapse succeeded by vomiting, general distention of the abdomen, and a feeble pulse, form the prominent features of the disease.

The clinical application of our knowledge of the nerve supply of the parietal peritoneum depends upon the various ways in which irritation of the nerve terminals may be made known. Such irritation may be evidenced by (1) local pain and sensitiveness; (2) referred pain; (3) superficial hyperesthesia; (4) superficial hyperalgesia; (5) muscular rigidity; (6) alteration of muscular reflexes. The manifestations depend partly upon the nature of the irritant.

2. *Free Fluid.* If the extravasation is extensive there will be signs of free fluid in the peritoneal cavity.

Whatever be the cause, the disease usually manifests itself somewhat suddenly, with pain on the right side of the abdomen, rapidly becoming general. A rapid and feeble pulse, fall of blood pressure, quick thoracic breathing, fever, intense depression, pallor, marked tenderness on pressure, rapidly developing tympanitis, vomiting, and an extremely anxious expression of countenance, are usually present. Although an elevation of temperature is usual, it is by no means constant, and affords only slight assistance in the diagnosis or prognosis.

3. *Jaundice* may or may not be present; if not present before the accident, usually comes on from absorption of biliary pigment by the peritoneum, and if the bowels can be moved, the motions will usually be clay-colored. The diagnosis of perforation of gall bladder is materially visualized by a history of definite prerupture symptoms. The following are classical:

(1) Definite reflex symptoms referred to the stomach at fairly definite periods, usually within thirty minutes after eating, with marked qualitative food dyspepsia caused by retention of gas-producing and greasy foods in the stomach constituting so-called "dyspepsia" with pylorospasm.

(2) Less severe pain and more prolonged soreness after spells aid the diagnostician since it is probable that stones are either not present or are too large to obstruct the duct.

#### DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

The diagnosis of peritonitis resulting from rupture of gangrenous cholecystitis with lithiasis practically resolves itself into the diagnosis of the cause of acute peritonitis starting on the right side of the abdomen. Although this may be due to perforation of the stomach, the duodenum or the ascending colon, etc., the chief affection for which it is likely to be mistaken is acute appendicitis.

In some cases, the normal descent of the cecum into the right iliac fossa does not take place, the cecum and colon, with the appendix, being found in the right hypochondrium in close relation to the gall bladder. A few cases have been recorded in which this relation was present, and an attack of appendicitis led to the development of an abscess beneath the right costal margin. Such a case would give rise to great difficulties, and it might be impossible to say until the abdomen is opened whether the condition is due to cholecystitis or to appendicitis. In appendicitis, the pain usually begins around the umbilicus, and is subsequently referred to the right iliac fossa, or it may start at a lower point in

the abdomen and pass toward the umbilicus. In gall-bladder inflammations there is almost invariably tenderness a little above and to the right of the umbilicus. The symptoms of acute peritonitis and paralytic obstruction of the bowels are common to both. Fortunately, exploratory incision is appropriate to both; but it is important to distinguish between them, for if the incision is made over the gall bladder in a case of appendicitis, or vice-versa, an abscess may be opened through the unaffected peritoneum, and give rise to general peritonitis.

#### PROGNOSIS

In peritonitis from diseases of the gall bladder or bile ducts the effusion is at first limited to the larger pouch on the right side of the abdomen. These cases are, therefore, amenable to treatment if operated on within a short time of the catastrophe, whereas in case of delay the fluid, which is infective, tends to pass into the pelvis and to produce general infection of the peritoneum.

Prognosis is thus entirely dependent upon the time interval of non-interference during which the peritonitis-spreading infection is in progress. Other factors directly dependent upon the time interval are:

1. Extent of peritoneal involvement.
2. Amount of intra-abdominal hemorrhage.
3. Gallstones, their presence and number and whether located and removed.
4. The patient's resistance.
5. Judgment and surgical skill.
6. Involvement of other organs (paralysis of gut, liver abscess, etc.).

#### TREATMENT

As soon as it is clearly made out that perforation has occurred, or even if it be suspected that such is the case, the abdomen should be opened in the right semi-lunar line. If pus and bile be found, they should be rapidly aspirated. It is advisable not to use gauze sponges to wipe away any of the exudate or leakage; nor to flush

the peritoneal cavity with saline solution as many still practice. The patient may be too ill to bear a prolonged operation (generally he is), and if so, free drainage will probably do all that is necessary under the circumstances. In draining, it should be borne in mind that the right kidney pouch forms a distinct peritoneal pocket, and that a drainage tube applied through a stab opening in the right loin affords a free exit for extravasated fluid coming from the neighborhood of the gall bladder. A similar stab wound may be made above the pubis to drain the pouch of Douglas.

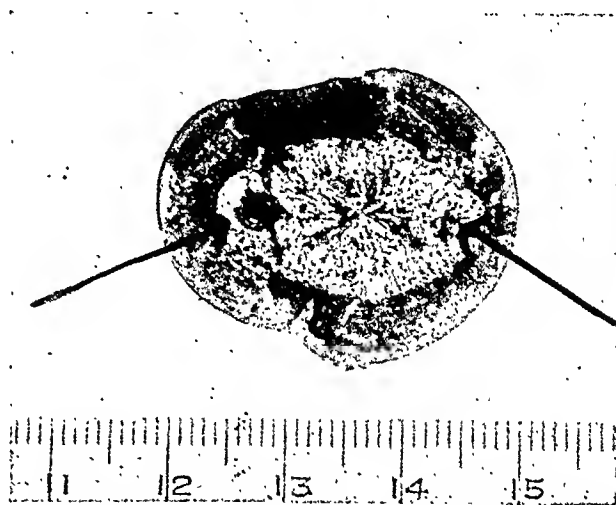


FIG. 1 Section of large pure cholesterol calculus. Arrows point to areas of softening with nests of pathogenic microorganisms.

#### CASE REPORT

E. R., white, aged forty years, physician, married, was admitted to the Beth David Hospital, November 8, 1925, complaining of slight pain in the right side of the abdomen. For several years he had had dyspepsia and heart-burn irregularly and at long intervals. Bicarbonate of soda gave him ample relief and he used it quite freely and regularly.

Five days before admission, late at night, he ate a spiced beef sandwich and a piece of cake; then he retired feeling well. Three hours later he was awakened by a severe, lancinating pain in the epigastrium which lasted the rest of the night. The following morning he was taken to Bellevue Hospital, where he was told that the condition of his gall bladder necessitated immediate operation. For two days he persistently refused operation. Meantime

vomiting appeared and the temperature and pulse rate began to rise. He was then removed from Bellevue to Beth David Hospital. He was then in considerable pain and was vomiting freely. His body and extremities were covered with a cold perspiration and the rectal temperature was  $101^{\circ}\text{F.}$ , pulse 110, respirations, 28; face was livid and somewhat cyanosed; teeth in poor condition. Lungs were negative; heart sounds, regular but weak. The abdomen was distended, especially the right half, and tenderness was general, more marked over the right hypochondriac region where a definite circular fluctuating mass could be made out. The entire right half of the abdomen was rigid, and dull on percussion. Digital examination revealed ballooning of the rectum. Blood pressure was 108/70. The urine contained a trace of albumin and occasional leucocytes. Blood examination showed a leucocytosis of 14,800 on November 8, falling to 9600 on November 13. Preopera-

tive diagnosis was perforation of gall bladder with circumscribed abscess.

For five days the patient persistently refused operation, then consented.

*Operation:* November 13, 1925, 8:30 A.M. Novocaine infiltration, right upper rectus incision. Peritoncum, adherent throughout to underlying mass, was incised for 1 inch without attempting to separate adhesions. A foul-smelling, greenish, thick pus poured out of the wound and with the aid of suction apparatus it was completely evacuated. I found that the gall bladder has completely sloughed away. The fluid-tract extended down to the iliac region. Gentle search for stones with one finger revealed one free in the peritoneal cavity. (see illustration). The abdomen was quickly closed with sufficient drainage. The patient failed to rally and died November 14, 8:00 P.M. The pus showed bacillus coli communis in pure culture.



## URETERAL CALCULUS

Ureteral calculus on the right side, may very closely resemble pyelitis in its symptoms, and therefore differs from appendicitis in the same respects. The pain with calculus may be more intense than that

with appendicitis, and the patient is bathed in perspiration, especially over the upper lip. This last condition is rather characteristic of ureteral calculus.—JOHN M. BIRNIE in *Boston M. and S. J.*



# ERYSIPELAS FOLLOWING BACILLUS PYOCYANEUS INFECTIONS IN MASTOID WOUNDS\*

SAMUEL J. KOPETZKY, M.D., F.A.C.S.

AND

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THE following five cases are reported because of the unwarranted appearance of erysipelas following a *Bacillus pyocyaneus* infection of the mastoid wound. In the first four cases, the organism was a secondary invader; in the fifth case, the mastoiditis was caused primarily by the *pyocyaneus bacillus*.

CASE I. Female aged four years. She had recovered from an attack of anterior poliomyelitis two years previously with atrophy of the left lower extremity. She had had scarlet fever at the age of three years, which produced a chronic discharge from both ears.

Otoscopic examination revealed a foul discharge filling both external auditory canals. When this was wiped away, large marginal perforations were found in both drums.

A bilateral simple mastoidectomy was performed with the object of instituting permanent postauricular drainage, thus preserving the hearing while lessening the danger of the disease to life. The child had an uneventful postoperative convalescence, and was discharged from the hospital at the end of two weeks.

For the following three months, the child was dressed daily and the wounds were irrigated with Dakin's solution. The fluid was also forced through the antrum into the middle ear. Under this treatment, the right middle ear ceased discharging after two months, but the discharge from the left ear persisted.

Three months after operation, culture from the mastoid wounds showed *Staphylococcus albus*; from the left middle ear, *Staphylococcus albus* and *hay bacillus*.

Two weeks later, there suddenly appeared in both mastoid wounds the characteristic bluish pus of the *pyocyaneus bacillus*. This was cultured and identified bacteriologically. Three

days after the appearance of the *pyocyaneus* infection, the child's temperature rose from normal to 105.6°F., and remained at approximately this level for the following six days. The skin surrounding both wounds became red and swollen and in two days a distinct raised border could be seen limiting the area of redness. This margin rapidly spread to involve the entire face and scalp and part of the anterior chest wall. Blood culture was negative. Blood counts taken during the period of the infection showed a high leucocytosis (18,000 to 21,000) with a high polymorphonuclear count (89 per cent). The erysipelas lasted ten days and then subsided. The temperature reached normal on the ninth day, and the child made a complete recovery. At the time of this writing, the right middle ear is dry and the posterior wound closed, while the left still shows a slight discharge due to the *Staphylococcus albus*. The left mastoid wound is still patent, and post-antral lavage is being continued on this side.

CASE II. Male, aged fifty-nine years, developed an acute mastoiditis on the right side after an attack of acute coryza. An acute coalescent mastoiditis was found and a simple mastoidectomy was performed. The sigmoid sinus was exposed by the disease and during the operative procedure was opened. The bleeding was controlled by an iodoformized gauze plug. Culture from the mastoid pus yielded the *Streptococcus hemolyticus*. The patient made an uneventful recovery and was discharged from the hospital at the end of the second week. The mastoid wound and middle ear healed within five weeks.

Seven weeks after operation, the patient complained of some pain and stiffness on the right side of the neck. His temperature was 100°F. There were marked swelling and induration on the right side just below the healed

\* From the Department of Otolaryngology, Beth Israel Hospital, New York City. Read before the Section on Otolaryngology of the New York Academy of Medicine, February 11, 1927.

mastoid wound. This swelling became progressively larger during the following week and the temperature range was between 100°F. and 101°F. daily. Because of the injury to the sigmoid sinus at the time of operation, it was thought that a thrombus might have developed in the venous channels, either in the bulb or in the internal jugular vein. He was accordingly readmitted to the hospital where two blood cultures were taken and found sterile. The blood count at the time of admission showed 9,000 white cells, 74 per cent polymorphonuclears.

An incision was then made in the neck directly over the indurated area. There was no pus found. The internal jugular vein was found normal in appearance. The mastoid wound was reopened and found clean. The portion of the sinus which was opened at the first operation was covered with healthy granulations. These findings and the negative blood studies, low temperature and aseptic clinical course definitely ruled out a venous thrombosis.

The following day, the dressings were saturated with the blue pus of the pyocyaneus organism. This infection was present in both the mastoid and neck wounds. The patient's temperature until then had remained below 101°F. Two days later it suddenly rose to 105°F. and erysipelas appeared around the mastoid and neck wounds. The redness and swelling, with its limiting raised border, spread over the face and neck and finally involved the upper and lower lids of both eyes. Dr. James A. Kearney was called in to examine the patient and diagnosed the condition as a solid edema of the eyelids due to erysipelas. He incised both upper lids; the subcutaneous tissue was gangrenous but no free pus was obtained. The conjunctivae became edematous and protruded beyond the margins of the lids. The erysipelas lasted ten days before subsiding. The total leucocytosis during the entire infection ranged between 13,500 and 16,000, while the differential count showed a polymorphonuclear percentage of 87.

The mastoid and neck wounds were healed at the end of the second week after the onset of the pyocyaneus infection. The solid edema of the lids gradually abated but the swelling of the conjunctivae persisted. Dr. Kearney replaced the protruding portions of the conjunctivae by inverting the lids and keeping them in position with adhesive tape.

One week later, that is, seventeen days after

the appearance of the erysipelas, the right middle ear began to discharge and the culture of the pus showed the pyocyaneus bacillus. Two days later, the patient had another attack of erysipelas which lasted for five days. The patient then went on to complete recovery and at the time of this writing is in perfect health.

CASE III. Female, aged eight months, developed a bilateral mastoiditis following measles. A simple mastoid operation was performed on both sides and the pathology found was that of an acute coalescent mastoiditis. The culture from both mastoids yielded a hemolytic streptococcus. One week after operation, the temperature, which until then had been below 102°F. suddenly rose to 104.6°F. The wounds were dressed and on the right side the gauze was saturated with the bluish-green pus of the pyocyaneus organism. This was cultured and the pyocyaneus bacillus was identified. No streptococci were isolated in either broth or blood-agar. The blood culture was negative. The blood count showed 14,500 white cells, 88 per cent polymorphonuclears.

Three days later, an area of induration appeared around the right mastoid incision. This spread with a raised advancing border and within four days involved the entire face and scalp. Both eyes were completely closed by edema. The erysipelas lasted two weeks and then subsided. Both middle ears were dry and the child was discharged from the hospital at the end of the fifth week as completely cured.

One week after leaving the hospital, the child developed an otitis media on the right side which was followed by another attack of erysipelas. This lasted one week before subsiding. The child has been well since.

CASE IV. Female, aged seventy-four years, developed an acute left mastoiditis following a severe cold in the head. A simple mastoid operation revealed an acute coalescent mastoiditis. The *Streptococcus hemolyticus* was isolated from the pus in the mastoid. At the first dressing, four days after operation, a *Bacillus pyocyaneus* infection was discovered and the dressings were covered with the characteristic bluish pus. Cultures showed a growth of *Bacillus pyocyaneus* but no hemolytic streptococci were isolated.

Two days later, the temperature rose to 103.8°F. Blood culture was negative. Leucocyte



count was 11,000, 79 per cent polymorphonuclears. The patient had a severe chill lasting fifteen minutes. The wound was dressed and the red, advancing border of erysipelas was found spreading toward the occiput. The temperature ranged between 104°F. and 105°F. for one week and then fell to normal by lysis. Subsequent blood counts showed the total leucocytes to vary between 14,000 and 16,500; the polymorphonuclears constituted 82 per cent to 91 per cent of the total. The erysipelas disappeared on the fifteenth day and the mastoid wound and middle ear healed within four weeks. The patient was discharged from the hospital at the end of the eighth week and has been well since.

CASE V. Male, aged seventy-one years, had been operated upon for a ruptured gangrenous appendix and general peritonitis. The culture from the peritoneal cavity yielded the *Bacillus pyocyaneus*. He then developed a pelvic abscess which also showed the pyocyanous bacillus on culture. Three weeks after his first operation, he complained of severe pain in his left ear. The drum ruptured spontaneously and a discharge appeared in the canal, which, when cultured, was found to be due to the pyocyanous organism. Two weeks later, a left parotitis appeared which was followed by a left facial paralysis. The examination of the left ear at this time showed definite signs of an acute coalescent mastoiditis. The blood culture taken at this time proved to be negative, as were two subsequent blood cultures taken during the next two weeks. The temperature at this time was normal and had been so for one week. Prior to that, the temperature varied between 100°F. and 101°F.

A simple mastoidectomy was then performed under local anesthesia and the entire cellular structure was found coalesced. No cause for the facial palsy could be found in the mastoid process. Incidentally, the origin of the facial paralysis from the parotitis was borne out by the presence of taste in the anterior two-thirds of the left side of the tongue. The *Bacillus pyocyaneus* was isolated in pure culture from the mastoid pus.

Three days after operation, the patient's temperature rose to 103.2°F. The dressings were saturated with bluish pus and on changing them an erysipelas was found to have developed around the mastoid area. Simultaneously with the appearance of the erysipelas in the mastoid

region, the condition also developed in the vicinity of the abdominal wound. In this case, the leucocyte count remained low throughout the period of the erysipelas, (9,000 total white cells, 72 per cent polymorphonuclears). The disease lasted thirteen days before subsiding entirely. The mastoid wound was still discharging pyocyanous pus at the time of this writing.

Erysipelas is a distinct clinical and pathological entity. It is an acute inflammation of the skin produced by the involvement of the lymph channels through bacterial invasion and is characterized clinically by redness, swelling and pain. The redness and swelling spread by a raised border leaving the formerly affected areas flattened and pale. The bacteria which most often produce erysipelas are a strain of streptococci. It was at first thought that there existed a specific streptococcus, the *Streptococcus erysipelatis*, which was the etiological factor. This organism was isolated by Feltgen<sup>1</sup> from every case of erysipelas that he examined and, when inoculated into both animals and humans, produced the typical clinical and pathological picture of erysipelas. The production of the disease by a specific organism was disproved subsequently by many observers since they were able to produce erysipelas with other strains of streptococci isolated from cases of general peritonitis, carbuncles, etc.<sup>2</sup> The fact that erysipelas can be caused by divers strains of streptococci definitely rules out the *Streptococcus erysipelatis* as the sole etiologic agent. Furthermore, the clinical and pathological entity known as erysipelas has been found associated with organisms other than the streptococcus. Jordan, Felsenthal and Petruschky<sup>3</sup> were able to produce erysipelas experimentally in rabbits by inoculation with staphylococci. Neufeld, using the pneumococcus, and Petruschky, using the colon bacillus, obtained the same results in rabbits.<sup>4</sup> Reiche<sup>5</sup> reports a case of erysipelas in a human which was due to the *Staphylococcus pyogenes*. Bonome, Bordoni-Uffre-

duzzi and Jochman also report cases of erysipelas due to the staphylococcus.<sup>4</sup>

The possibility of the pyocyaneus bacillus having been the causative factor in our cases must be considered. While this organism usually produces a mild type of infection, it is capable of causing a virulent one. Wassermann<sup>6</sup> in bacteriological studies made during an epidemic of severe umbilical infection, found the etiologic factor to have been the *Bacillus pyocyaneus*. Lenhartz<sup>7</sup> and Neumann<sup>8</sup> found that organism in the blood of patients suffering from general sepsis following mastoidal disease. Brill and Libman<sup>9</sup> as well as Finkelstein<sup>10</sup> isolated the pyocyaneus bacillus in pure culture from the blood of patients having general sepsis. While the percentage of such findings is small, as reported by E. Fraenkel,<sup>11</sup> who found this organism in only 4 of 1,100 cases of general sepsis, its capacity to produce a virulent infection is to be noted.

In three of our cases (II, III and IV), the *Streptococcus hemolyticus* was the organism found in the pus in the mastoid process. However, with the appearance of the pyocyaneus infection, the streptococcus was killed off and could not be isolated in cultures. That the pyocyaneus organism has the power to destroy other organisms by lysis has been demonstrated by Emmerich and Löw.<sup>12</sup> They have isolated the substance which they term pyocyanase and have shown its ability to destroy other bacteria. This, and the fact that the erysipelas appeared in our cases after the onset of the pyocyaneus infection and after the streptococcus could no longer be obtained on culture, speak against the erysipelas having been caused by the streptococcus in the three cases mentioned. In our fifth case the pyocyaneus bacillus was the cause of the mastoiditis and no streptococcus was present. Furthermore, when one considers that the incubation period of erysipelas following surgical trauma is usually from twenty-four to thirty-six hours, it will be seen that in our cases, with the exception of Case v, the

onset of erysipelas bore no such relation to the time of operation. The period of incubation coincided with the time between the appearance of the pyocyaneus infection and the onset of erysipelas. We believe, therefore, that since the streptococcus organism could not have been the cause of the erysipelas in these cases, it is likely that the *Bacillus pyocyaneus* was the etiologic factor.

### CONCLUSIONS

1. Five cases of mastoiditis are reported wherein erysipelas developed following a *Bacillus pyocyaneus* infection of the mastoid wound.
2. Erysipelas is a clinicopathological entity not produced by a specific organism. It is further to be noted that organisms other than the streptococcus have been reported as producing erysipelas.
3. The possibility of *Bacillus pyocyaneus* as a cause of the clinical and pathological entity known as erysipelas is strongly emphasized.

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# ANGIONEUROFIBROMA OF THE OCCIPITAL NERVE\*

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ROCHESTER, MINN.

NEUROFIBROMAS may occur in almost any part of the body and give rise to a variety of symptoms. A variety of cellular changes in these neoplasms may occur, rendering the clinical diagnosis difficult and the advisability of their surgical removal questionable. Tumors that fall into this category may occur either singly or as a manifestation of generalized neurofibromatosis.

The oncology of neurofibromas is still

small import because the comparative degree is usually low.

The case of a median, extracranial tumor in the occipital region which I am reporting is of interest because symptoms other than deformity were not associated with it. The tumor had increased rapidly in size.

## REPORT OF A CASE

A boy, aged thirteen years, was brought to the Mayo Clinic because of a swelling in the occipital region which had been present

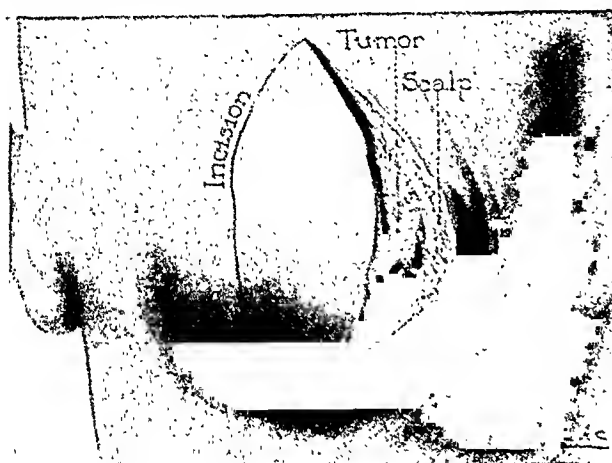


FIG. 1. Size and position of the tumor, and the elliptical incision used.

incomplete. The origin remains a matter of dispute among pathologists, some authorities attributing it to the mesodermal and some to the ectodermal layer. Von Recklinghausen, whose name has been identified with all varieties of nerve tumors, believed that they originated from tissue in the endoneurium, perineurium or epineurium. But with the advent of more selective staining methods, Pick, Bielchowsky, and Verocay catalogued them with neoplasms arising from the ectoderm. Regardless of their origin, these tumors are amenable to surgical procedures and should be removed completely. The usual microscopic picture is classically benign but, if evidence of malignancy is found, the significance is of

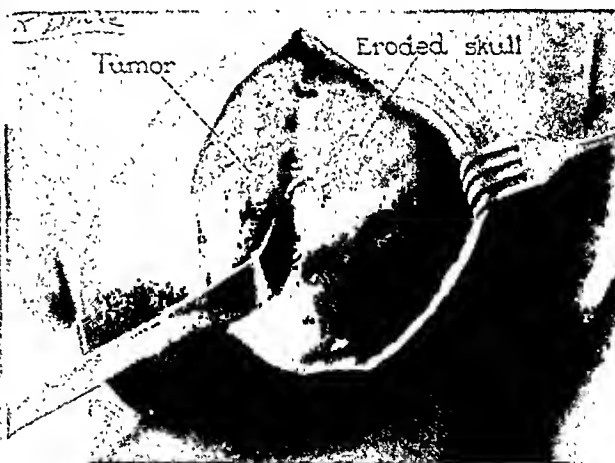


FIG. 2. Retraction of the edges of the skin and separation of the tumor from the underlying skull.

since he was six months old. The family history was unimportant. When the mass was first observed it was about 1 cm. in diameter. There was no change until he was two and a half years old, when his parents noticed that it was firm, movable and about 3 cm. in diameter. When he was eleven, the growth was about 4 cm. in diameter, and still firm and freely movable. The following year the tumor became soft on palpation and continued to enlarge. The tumor did not cause symptoms.

*Examination.* The blood pressure, pulse and temperature, and urine were normal. The hemoglobin was 73 per cent; the erythrocytes numbered 4,620,000, and the leucocytes 9800. The blood Wassermann reaction was negative. The fundus and fields of the eyes were normal. Roentgenograms of the skull showed

\*From the Section on Neurological Surgery, Mayo Clinic. Submitted for publication April 8, 1927.

marked multiple depressions in the outer table of the occipital bone. The tumor, 10 cm. by 10 cm., extended from the superior margin of the occipital bone to the upper cervical region.

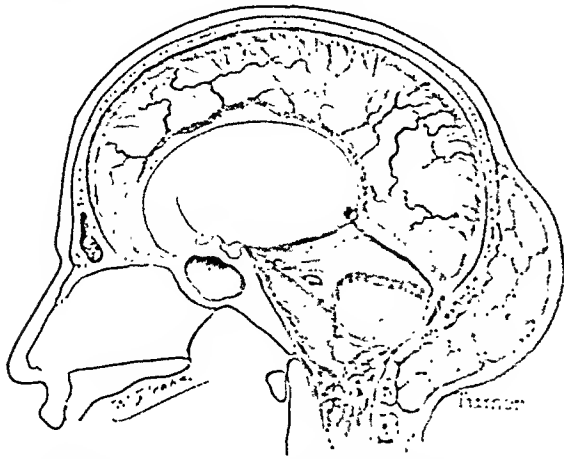


FIG. 3. Diagrammatic sagittal section showing relations of the tumor to the skin and the skull as well as the erosions of the bone.

It was rather nodular, tender about the margins, and softer and semifluctuating in the center. It was entirely covered with hair and

and there was no transmission of light. Neurologic examination proved absolutely negative. A diagnosis of neurofibroma was made.

**Operation.** An elliptical incision was made vertically over the tumor. The tumor proved to be extremely vascular, so that it was necessary to infiltrate the area with procaine containing epinephrin. Further, to insure hemostasis, a Heidenhain stitch was used to encircle the area. The skin was then reflected on both sides and the upper margin of the tumor was exposed. It was soft, gray, and contained numerous thrombosed vessels. The upper margin was easily freed from the underlying bone and was retracted posteriorly. The under surface was covered with numerous small nodules which had eroded the bone in some areas and had stimulated hyperplasia in others. However, the tumor was easily separated and removed completely. The skin edges were approximated, the Heidenhain suture removed, and closure completed. Healing and convalescence were uneventful.

On microscopic examination the structure



FIG. 4. Microscopic section showing the arrangement of the cells and the distribution of the vessels throughout the structure. (X60.)

did not seem to extend lower than the foramen magnum. There seemed to be a projection through a crater of the bone. In the lower half, it was rather firm and nodular, like an irregular bone overlaid with soft tissue; this part was movable from side to side. Pulsation could not be demonstrated in the tumor nor could any bruits be heard over it or anywhere about the head. It was not painful to pressure



FIG. 5. Profile of the patient after operation showing the healed wound and the position of the Heidenhain suture used for hemostasis.

was fibrous in character, the fibroblasts being arranged in strands and whorls interspersed with numerous vessels. The pathologic diagnosis was angioneurofibroma (Figs. 1 to 5).

# A PLASTER TABLE FOR APPLYING CASTS WITH THE PATIENT RECUMBENT

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THIS table was designed for the application of plaster casts to the trunk, legs, shoulder or upper arm with the patient lying on his back, his side or his abdomen.

The structural parts of the table are of galvanized gas pipe or steel tubing. Its length

those known in the instrument trade as locking extension castors. Each wheel may be locked by pressure of the foot on a small trigger; the stem on the castor allows the table to be raised a height of about 14 inches at one or both ends.

The top boards (Fig. 1, A1, A2, A3) of the table are removable in sections; there are

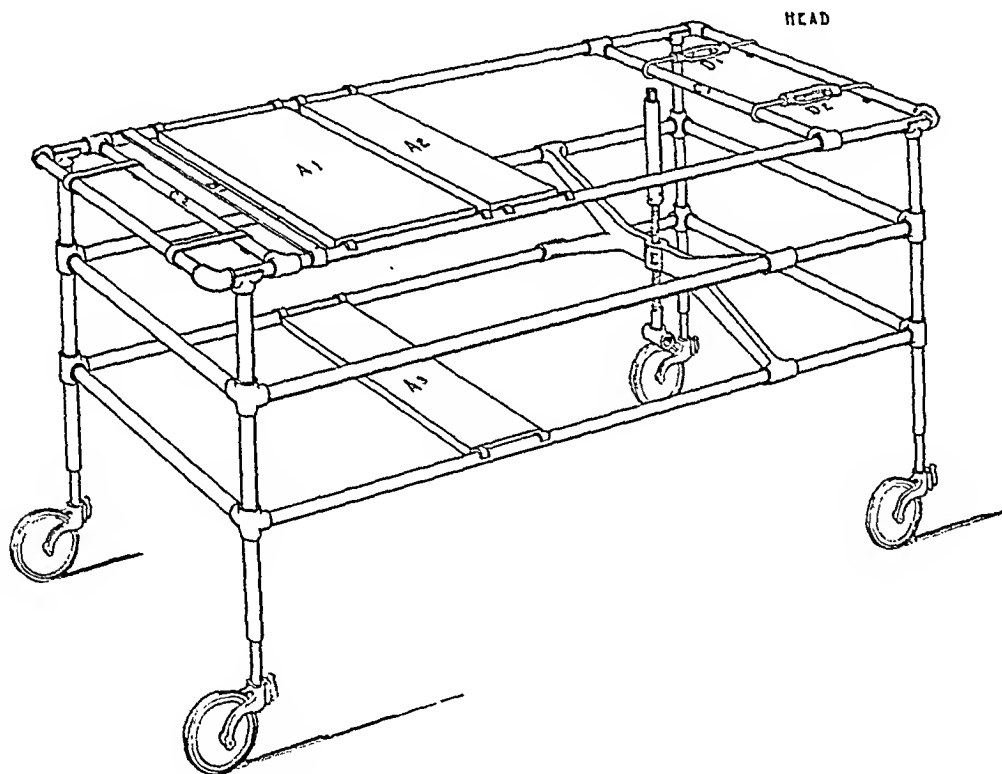


FIG. 1. Fracture table. A1, A2, A3, removable top boards. B1, one of the narrow cross-pieces of which there should be four or five. C1, C2, hammock bars. D1, D2, turnbuckles for controlling hammock tension. E, the underslung support shown in the shoulder position (note that it is adjustable as to height by the screw). A flat sheet of steel not shown here rests between the turnbuckles and when in use supports the patient's head.

is 68 inches; width, 30 inches; height, 34 inches, which may be increased to 50 inches. The uprights and their connecting pieces are of 1 inch pipe; the top is of  $\frac{3}{4}$  inch pipe, 30 inches by 68 inches; it rests on the uprights, each corner of which is provided with a 1 inch tee of which the upper half has been sawed off to get a deep groove. The wheels are

six of these boards which are long enough to fit between the side pipes of the frame with about  $\frac{1}{4}$  inch to spare. Four are 6 inches wide while two are 12 inches wide. Each board engages on the side pipes by means of a pair of flat iron strips ( $\frac{1}{8}$  inch thick and 1 inch wide) bent at the ends to form hooks. Each board should also have attached to its under

surface a couple of short pieces of iron at right angles to the length of the board to prevent warping. All these iron pieces are bolted to the under surface of the boards by small carriage bolts, which on account of their flat heads hold well and do not protrude. Oak,  $\frac{3}{4}$  inch thick, is best for the boards. In addition to the boards there should also be provided six or eight cross bars (B1) of steel, 1 inch wide by  $\frac{3}{16}$  of an inch thick, bent down at the ends to rest on the top bar in the same manner as the boards are supported.

On the top pieces of frame are two cross-pieces of pipe (C1, C2) made to slide on the

sits an ordinary 1 inch bench screw; to the top of this a piece of 1 inch Shelby tubing about 8 inches long is fastened by means of two tapered pins through tubing and screw. A second piece of Shelby tubing fits within and extends 1 inch above the top of the first; a slot  $\frac{3}{16}$  of an inch wide and 1 inch long is cut at the top of this second piece of tubing. I shall call this the underslung support. It will be noted that the top member of this support is designed to receive the hip support as used on the Albee table.

A part not possible to show on the drawing, without spoiling its effectiveness, is a sheet of

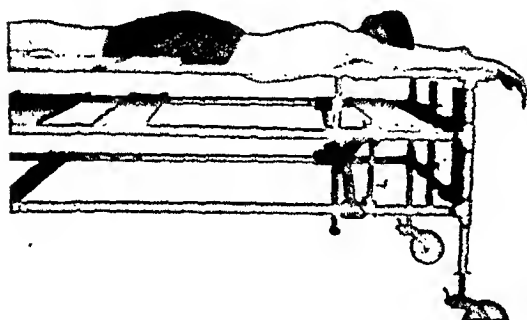


FIG. 2. Position for application of cast to spine in extension, for fracture of body of vertebra, tuberculosis of the spine, etc. The short vertical piece (F) adjacent to the underslung support is a holder for an anesthesia screen.

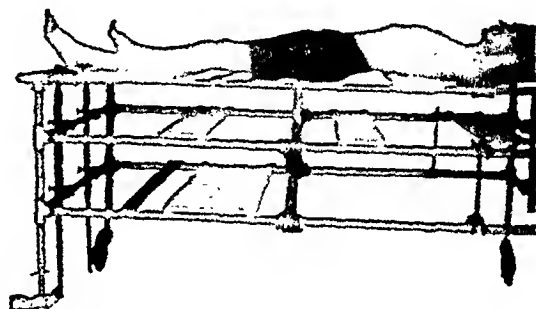


FIG. 3. Position for application of cast to pelvis. Note that pelvis is supported by the underslung support.

pipe by means of tees, which I shall call the hammock bars. The one at the foot is attached permanently to the short cross pipe, while the one at the head rides free. To control the upper movable cross-piece there is provided a pair of heavy turnbuckles with hooks (D1, D2). These hooks are made by bending and flattening a hook on one end and cutting a long thread on the other end of each four pieces of  $\frac{3}{8}$  inch steel rod. The turnbuckle is obtainable at any hardware store.

The hammock was originally made of canvas but it has been found convenient to use four to six muslin bandages in the form of a loop over both hammock bars, the ends being tied tight. The proper tension is obtained by means of the turnbuckles. With this type of hammock the patient may be removed from the frame by cutting the bandages at the head and foot of the table.

Riding on the four lengthwise pipes of the frame work is a forging or casting (E); in the center of this a vertical hole is drilled in which

steel about 18 inches by 20 inches that is strapped to the head of the top frame. This serves as a head rest for the patient.

In this table I have made provision for holding a patient in a comfortable position for the time necessary to apply various effective plaster casts. When a hammock is stretched (at any desired tension) between the hammock bars the patient may be laid face down thereon and a cast applied to hold good spinal extension position (Fig. 2) which may be desired in tuberculosis, or fracture of the body of a vertebra. Using the underslung support under the pelvis (Fig. 3) a cast may be applied including, or not, a spica of one or both thighs. Such a cast has been found useful in cases of spondylolisthesis and hyperflexion conditions in the sacrolumbar region. The possibility of the latter condition being the cause of symptoms has been discussed by me.<sup>1</sup>

<sup>1</sup> Robinson, W. H., and Grimm, H. W. The sacro-vertebral angle, its measurements and the clinical significance of its variations. *Arch. Surg.*, 1923, 11, 911-916.

With the support moved towards the head of the table (Fig. 4) a comfortable position is obtained for application of abduction casts to the arm or shoulder. This arrangement is also effective in the application of a cast after open reduction of fracture of the clavicle. The table is also useful during the application of casts or splints to the leg, knee or ankle (Fig. 5). Hyperextension at the hip, as after the Soutter fasciotomy, is obtained by placing the pelvis on the rest, and the foot or feet on a board placed on the lower pipe. It is, of course, feasible to do this open operation

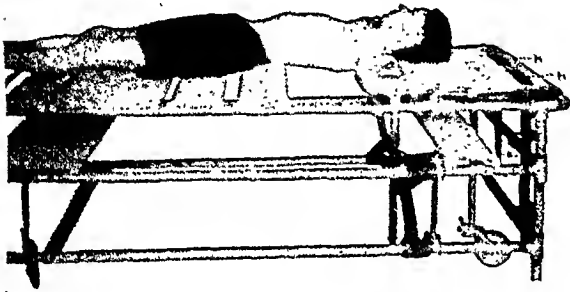


FIG. 4. Position for application of cast to shoulder. The hammock can be seen under the patient's neck. In this position the body may rest on the tightly stretched hammock or be partially supported by the underslung support. The two vertical pieces (c) attached to the lower cross bars at the head of the table are for the traction posts which extend upward through holes (n) cut in the metal head-piece.

on the table. When the dressings have been applied to the wound it is quite a simple matter to place the patient in position for the application of the cast.

The table can be used to obtain the Stimson position for reduction of a dislocated shoulder by gravity. For this position it should be raised to its full height on the extension castors.

By attaching vertical uprights to the head and foot, a traction device may be made to exert any amount of traction on the neck or trunk. Likewise traction may be devised for one or both legs by weight or screws.

The size and strength of the table, together with the large castors, make it useful in handling the unusually heavy fracture patient, because he may be placed in a comfortable position, with the injured parts easily exposed and he may be trans-

ported from the operating room or plaster room to the roentgen-ray department and to bed without having to be lifted to and from a ward carriage.

If the plaster is setting slowly the entire upper frame holding the patient may be lifted off and placed on the bed. For this purpose I use two blocks 4 inches by 4 inches and several inches wider than the frame itself. These are laid crosswise on the bed to support the frame. When the cast is so hard that there is no danger of buckling or indenting, the frame is removed. This is done as follows: (1) remove the sheet steel

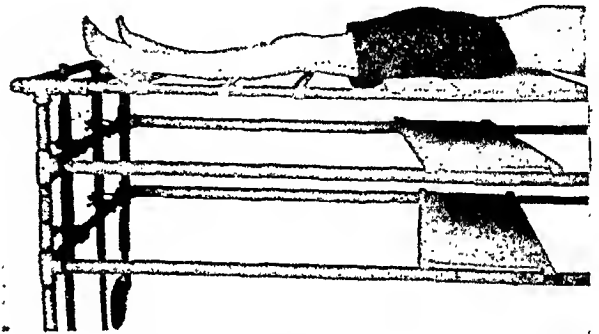


FIG. 5. Position for application of casts or splints to leg, knee or foot. Note the narrow cross bars which may be placed where required. The two vertical pieces (i) attached to two lower cross-members at the foot of the table by hooked bolts and wing nuts are for traction posts.

head-piece which is attached only by two straps; (2) remove any cross-pieces under the patient; (3) if on a hammock cut it at head and foot; (4) move upper hammock bar to top of frame. The patient now lies on the bed and the frame can be lifted away.

I have found no similar device in the surgical literature during the past ten years. Nevertheless I am aware that the gas pipe frame is, in one form or another, used in many hospitals. The table is presented in its entirety only in the hope of calling attention to particular features such as the hammock extension device, the underslung support, the removable top sections, the extensible legs and the large locking castors, as well as to the advantages of this type of table for holding the patient during the application of certain casts.



# AN ADJUSTABLE TRACTION SPLINT

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THE simple apparatus shown in the accompanying photograph was devised and made several years ago for the purpose of overcoming an adduction contracture of both hips. With the plates incorporated in two leg casts, abduction was gradually obtained and maintained by means of the turnbuckle screw. Since that time, the apparatus has proved of value as a temporary splint in fractures of the extremities and as a substitute for the Hawley table in cases of over-

alignment of the fragments without jeopardizing either the traction or immobilization previously acquired. In cases of contracture about any of the larger joints, and especially in flexion contracture, suitable lateral application of the splint permits the exertion of a constant and carefully graded force.

The apparatus consists of two flexible plates for incorporation in the plaster cuffs. Soldered to each plate is a steel rod  $\frac{5}{16}$  inch in diameter and  $1\frac{1}{2}$  inches long,

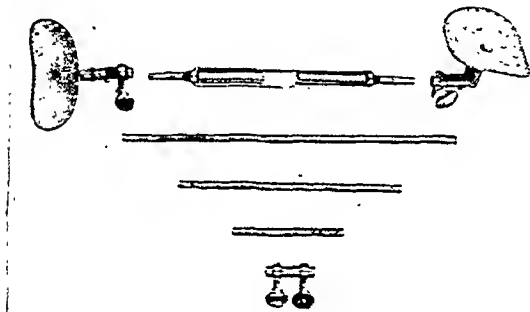


FIG. 1.

riding fractures. By incorporating two such splints into plaster cuffs applied above and below the site of fracture, practically any type of displacement may be overcome. When the turnbuckles of these splints are elongated simultaneously, simple traction is exerted. If one turnbuckle is used, unbalanced traction is applied on the same side and any angulation to the opposite side is corrected. By appropriately molding the cuffs and adequately protecting bony prominences, the surgeon acquires almost the same results as in skeletal traction and at the same time reserves to himself the liberty of making necessary changes in

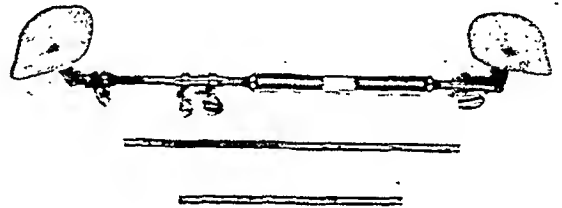


FIG. 2.

which has, hinged at its free end, a steel tube about 1 inch long and of sufficient diameter to accommodate a steel rod  $\frac{5}{16}$  inch in diameter. The rest of the apparatus consists of an adapter, a series of steel rods of varying length so that limbs of different sizes may be fitted, and an ordinary turnbuckle the ends of which have been machined down to fit the steel tubing.

The apparatus is simple, inexpensive and may be made easily by any one with the slightest mechanical aptitude. When disassembled, it takes but little room in the physician's bag. It may be put to a great variety of uses, and may prove of especial value in the treatment of compound fractures by permitting free access to the wound.

## THE ASPIRATION TREATMENT OF TRAUMATIC JOINT EFFUSIONS

**T**WICE before in the JOURNAL—as a contributed article (February, 1925) and as a brief editorial (December, 1925)—we advised the treatment of traumatic synovitis, especially of the knee, by aspiration of the fluid and mobilization. The observation that the hoary management by prolonged immobilization, followed by protracted baking and massage, continues to prevail generally in practice and in textbook teaching, leads us to revert to the subject and to urge again a method of management that gives prompt relief of pain and greatly shortens the disability.

As Metcalfe<sup>1</sup> observed in over 300 knee-joint aspirations, and as we also found and recorded, the fluid in cases of traumatic synovitis is at first blood or bloody, i.e., the condition is at the outset a *hemarthrosis*. Gradually, as the blood is absorbed, the fluid becomes pink, then yellow, and only after a variable number of days is it “*water on the knee*.”

Because of the constant presence of blood in these joint effusions one must assume that there is a tear in the capsule and some injury to ligament, cartilage or bone. In many cases of simple so-called “sprains” of the knee there is a crack in the head of the tibia or condyle of the femur, or a tear or displacement of the cartilage. If an acutely traumatized joint be opened after a short period the synovial membrane will be found soft, red and swollen, with small fibrin shreds adhering to its surface and floating in the bloody synovial fluid. The subsynovial vessels are dilated and congested and there is an apparent new formation of capillaries.

<sup>1</sup> Metcalfe, R. F. Traumatic synovitis of the knee joint and its treatment. *Surg., Gynec. & Obst.*, 1922, xxxiv, 270.

The synovial villi are hypertrophied and congested. Microscopically, the synovial membrane is seen to be infiltrated by numerous small round cells and polymorphonuclear leucocytes. There is some proliferation of the fixed tissue cells and of the endothelial lining of the joint. The fluid in the joint space contains a large number of mononuclear leucocytes which are apparently actively engaged in phagocytizing the red blood cells. Seen several days later, the fluid has become much lighter in color and the synovial tissue is found to contain a large number of erythrocytes which have permeated the endothelium. The synovial villi are bound together by fibrinous adhesions which are beginning to organize and over which endothelium has already begun to proliferate. If left to itself the fluid is slowly resorbed, but the capsule may remain lax and the intra-articular fat pads hypertrophied and thickened. The presence of fibrin in the synovial fluid, the formation, perhaps, of synovial adhesions and the usual method of treatment by immobilization encourage the occasional development of joint-mouse and of joint stiffness.

The generally employed treatment by splinting, strapping, massage, baking, etc., is not only very tedious but also thus quite often leaves a weakened joint and atrophied muscles. By contrast, aspiration of the fluid promptly relieves pain, restores contour and permits normal motion, and it reduces the period of disability from several weeks to a few days, and the period of treatment from two months or more to about two weeks or less.

Aspiration of the knee-joint, especially, is very easy of performance. It is simpler and less hazardous than aspiration of the

chest. Under aseptic precautions the chance of infection is very remote. None of the few authors who record experiences with this treatment has noted a single instance of infection. With a stout needle (about 19 gauge), attached to a suitable syringe, the joint or the quadriceps bursa is entered on either side, and as much of the fluid as possible is drawn out, with the assistance, if need be, of compressive manipulation. If in a few days the joint refills, the aspiration is repeated. It is seldom necessary to do it more than twice in uncomplicated cases, unless the patient has borne weight on that joint. Frequent recurrence of effusion means that the lesion is more than a ligamentous "sprain"—probably a tear of the articular cartilage.

Frequent motion of the joint immediately after aspiration should be encouraged but it is best to forbid weight-bearing for several days. The patient may walk with crutches, however, putting no weight on the joint. At the end of about a week, if there is practically no effusion, weight-bearing is tried, to be abandoned immediately, however, if there is a recurrence of swelling. Willems, who may be regarded as

the father of the aspiration treatment, though not the first to use it, observed that "the goal to be reached is to restore the physiological function of the articulation as much as possible and in the case of the knee, this function is walking." Nevertheless, immediate weight-bearing often causes fresh bleeding, increases the number of aspirations needed and delays the cure.

In most cases of "sprained ankle" the swelling is not due to effusion in the joint itself and they do not often lend themselves to aspiration. The ankle is a mortise joint, not subject to the same lateral strain and torsion as the knee; therefore immediate weight-bearing is less apt to do damage. When the effusion is in the ankle joint itself aspiration will give great relief and hasten the cure, just as it does in the knee. In many cases of traumatic effusion in the shoulder, elbow, wrist and even the finger joints early aspiration of the blood or bloody fluid will be very helpful.

After an arthrotomy the joint fills with bloody fluid. This, too, we would treat, as we do traumatic synovitis, by aspiration, repeated as often as necessary.—W. M. B.

## THE NEW SERIES OF THE JOURNAL

WITH this issue the JOURNAL ends its first year of the New Series—a year during which the JOURNAL has undergone great changes. It has been trebled in size; it has been given a new format; it has been printed on much better paper; it has added to care in editing and literary expression typographical elegance and painstaking press work; it has become the organ for the scientific transactions of several important surgical societies; it has the interested cooperation of an Editorial Board of distinguished surgeons who have written editorials, articles, commentaries, and book critiques, and have passed on certain contributions.

In accordance with its pledge, the advertising pages of the JOURNAL have been freed from products that have not been approved by the Council on Pharmacy and Chemistry of the American Medical Association.

Reviewing the JOURNAL's accomplishments of a single year, both in its contents and in its appearance, the editors and publishers are by no means satisfied. They are planning to make the JOURNAL bigger and better. With the appreciated support of the profession, they mean to continue its development as a dignified, artistic magazine of practical surgery indispensable to the general and special surgeon.—W.M.B.

## ⊕ANTONIO CARLE⊕

ONE of the most distinguished of Italy's surgeons died last February in Turin, where for thirty years he held the chair of Surgical Clinic at the University and for nearly forty years he had been the chief surgeon of the St. Maurice Hospital.

Antonio Carle, born near Turin seventy-three years ago, studied medicine at the university of his native city, and there became an assistant to one of the most learned surgeons of the St. Maurice Hospi-

learned pupils who, scattered through Italy, hold many of the chairs of surgery at different universities and are at the heads of surgical departments of various hospitals.

Antonio Carle was the first who discovered the *Bacillus clavatus* of tetanus, (described afterward by Nicolaier) and the first to demonstrate the possible transmission of the dreaded disease. As early as 1898 he established by striking



Antonio Carle (1854-1927).

tal, Berruti, whom he succeeded upon the latter's death.

In the eighties he visited several of the great clinics of Europe and spent two years in Vienna as a special assistant to Billroth. Returning home he won by merit and competition the vacant chair of Surgical Clinic at the University of Turin, which he held until his death with great honor to himself and great credit to his country, leaving as a monument a host of most

statistics the success of gastric surgery, then in its early years. In 1899 he published a contribution to surgery of the thyroid, with extensive statistics on the operation for goiter, and shortly after "A contribution to the operative treatment of fibromyoma of the uterus, with 979 cases." He also contributed notably to our knowledge of surgery of the kidneys and biliary organs, a field in which he was a very skilful and successful operator.

For his great scientific and philanthropic accomplishments he was elected Senator of Italy and received from the Italian government all the honors usually conferred

upon the most eminent men. His life, however, was a modest one, entirely devoted to his work as student, operator and teacher.

PAOLO DE VECCHI.

## ⊕ EDWARD EMMET MONTGOMERY ⊕

IN the passing on April seventeenth of Edward Emmet Montgomery, at the age of seventy-eight, American gynecology loses an outstanding figure—a man of originality, resource, forcefulness and conviction.

ability was not at first appreciated by his Alma Mater, but by a competing school, and in 1886 he became professor of gynecology in the Medico-Chirurgical College in Philadelphia, and in 1891–1892 he occupied the double chair in that institution.



Edward Emmet Montgomery (1849–1927).

Born in Newark, Ohio, in 1849, he was graduated from Dennison University, Ohio, in 1871, and from Jefferson Medical College, Philadelphia, in 1874.

During Dr. Montgomery's fifty-three years of practice in Philadelphia, he was identified with the development of obstetrics and gynecology in this country and his influence was of a national character. Yet, as so often happens, his pedagogic

In 1892 he was called to the chair of gynecology at Jefferson, first in the capacity of Clinical Professor, and then as Professor, a position which he held until his retirement from practice in 1917.

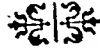
Dr. Montgomery's training in obstetrics and obstetric pathology was the result of his long service as obstetrician to the Philadelphia Hospital, which afforded him an opportunity to develop his rare diag-

nostic acumen and courageous operative resourcefulness. It was in this institution that he performed the first successful oophorectomy before a public clinic in Philadelphia.

He served at various periods as Attending Gynecologist to St. Joseph's and the Jefferson Hospital and as Consultant to the Kensington Hospital for Women, the Lying-In, Charity and the Jewish Hospitals.

Dr. Montgomery was a prolific writer,

an impressive teacher, a keen diagnostician and a great operator. He was always master of the situation. No emergency unnerved him. Warmly esteemed by his colleagues, he was elected to the presidency of almost every local, state and national medical society to which he belonged. Montgomery was one of the giants of the passing generation in medicine—self-trained and reaching a leading rôle by persistence, courage and an iron physique.—JOHN OSBORN POLAK.



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## BOOK REVIEWS

**MICOSI CHIRURGICHE.** By G. Bolognesi and G. A. Chiurco. Siena Libreria Editrice Senese. S. Bernardino, 1927.

This is the second volume of a Treatise on Human Mycopathology (*Trattato di Micro-Patologia Umana*), directed by Prof. G. Pollacci of Siena—a work which, when completed, will have about 1200 pages and 500 illustrations.

In this volume on surgical mycoses Bolognesi and Chiurco arrange the material under the headings: 1. Well-defined mycoses. 2. Mycoses not well-defined. 3. Mixed or polymycoses. 4. Doubtful mycoses. 5. Pseudomycoses.

The greater part of the work is devoted to the well-defined mycoses. These are subdivided into twenty-two chapters, namely: actinomycosis, mucormycosis, saccharomycosis, mycosis due to malbranchea, oosporosis, moniliiasis, mycosis due to mycoderma, mycosis due to trichosporium, mycosis due to madurella, mycosis due to indiella, aspergillosis, mycosis due to sterigmatocistis, penicilliosis, cladiosis, acladiosis, acremoniosis, sporotrichosis, monosporiosis, emisporiosis, trichosporiosis, mycosis due to acremoniella, mycosis due to haplogaphium.

Of the pseudomycoses, bothriomycosis and staphylomycosis are given special treatment.

The first part contains only the preface, with bibliographical notes on the mycoses in general, and the full treatment of two well-defined mycoses, viz., actinomycosis and mucormycosis. Actinomycosis is indeed discussed in a most exhaustive and painstaking manner. It is a wonderful synthesis of pathological and clinical data.

The section on mucormycosis begins with the principal species of *mucor* pathogenic for man, and then is subdivided regionally for the consideration of clinical data.

The volume is rich in bibliographic references and illustrations as well as in scientific details. It contains much that is original. The completed treatise will be a valuable work of reference.—PAOLA DE VECCHI.

**SURGERY OF NEOPLASTIC DISEASES BY ELECTROTHERMIC METHODS.** By George A. Wyeth, M.D., N. Y. Foreword by Howard A. Kelly, M.D., Baltimore. 8vo. Cloth. \$7.50. Pp. 314; 137 illus. N. Y. Paul B. Hoeber, Inc., 1926.

"The idea of an electrical current of cutting power did not originate with the author. Such a current has been the basis of considerable experimentation for several years." Nevertheless, Wyeth has made a splendid contribution to the evolution of this modality both mechanically and surgically, and his name is written large in this development in the surgery of malignant growths.

The terminology of high frequency currents has been very confusing. "Diathermy" is a word differently employed in different countries and, indeed, by different writers in the same country; and the distinction between "surgical diathermy" and "medical diathermy" has not entirely eliminated this element of the confusion. "Desiccation" and "fulguration" are also terms that have been rather loosely used. Although Wyeth adds another word "endothermy" to those already in use, his book goes far to clear the fog of terminology. Indeed, it is to this clarification and to a description of the various surgical high frequency currents that he addresses himself in the first chapters. As summarized by him the surgically used high frequency currents ("endothermy") are: 1. Monopolar (Oudin current, which produces a dehydrating effect): electrodesiccation (Clark) and fulguration (de Keating-Hart). 2. Bipolar (d'Arsonval current which produces a coagulating effect): electrocoagulation (Doyen) and surgical diathermy (Nagelschmidt). 3. Endotherm knife (Wyeth), a three-element vacuum tube current which produces a cutting effect and seals lymphatics as it cuts. "The endotherm knife is not a true knife but a current operating through the same needle, held in the same handle, employed for applying the dehydrating monopolar current or the coagulating bipolar current. It is the current which cuts, or more properly, which causes a disintegration of the tissue, the line of incision being marked by narrow margins of coagulation. The needle is but the applicator by which the operator directs the incision . . . the cutting current . . . is of such extremely high frequency that it produces a molecular dissolution of the tissues, sealing lymphatics as it cuts by a thin line of coagulation. The incrustation which characterizes the cut of the 'cautery knife' does not follow . . . and [the author's] records



show an unbroken list of healings by primary union, with a thinner, finer . . . scar."

A large part of the book is devoted to the description of the technique of operating with the endotherm knife for various types of growth in various situations. It is replete with records of freely illustrated cases, the results of which leave no doubt that the high frequency cutting current is better than the cold knife in the removal of malignant tumors. Although Wyeth's work and many of his cases have been made familiar by his previous publications in various journals, this conveniently sized volume is one of the most important surgical books published within the past year.

**INFECTIONS OF THE HAND.** By Lionel R. Fifield, F.R.C.S. (Eng.); Surg. Registrar, 1st Ass't and Demonstrator of Anat., London Hosp. 12mo. Cloth. \$3.25. Pp. 200; 13 pl. (2 col.), 56 text illus. N. Y. Paul B. Hoeber, Inc., 1927.

Recognizing Kanavel's "masterly monograph" on this subject as "classical," Fifield, who has written also a serviceable book on Minor Surgery, has prepared this small work for students, interns and practitioners. It is based on the author's dissections, serial sections and injections as well as his surgical observations. The descriptions of lesions and of the surgical procedures indicated are clear and concise; and the manual may be recommended to those who have not time or inclination to study the larger work of Kanavel. Speaking of that form of "subcuticular infection . . . affecting the nail-fold and known as paronychia (or by some as perionychia)," Fifield says: "It may take the form of a very small subcuticular abscess at the edge of the nail-fold, requiring a small incision to evacuate the bead of pus." It seems curious that so many authors who write on hand and finger infections recommend only incisions for such paronychias, apparently failing to recognize that it is just the type of case above described that can be drained adequately and cured promptly without incision, by merely lifting the edge of the nail-fold with the flat of a probe, as we have pointed out in Surgical Suggestions.

**THE PRACTICAL MEDICINE SERIES.** Comprising Eight Volumes on the Year's Progress in Medicine and Surgery. Under the General Editorial Charge of Charles L. Mix, A.M., M.D. GENERAL SURGERY. Ed. by Evarts A. Graham, M.D., Prof. Surg., Washington Univ.

School of Med. Series 1926. 16mo. Cloth. \$3. Pp. 726; 152 illus. Chicago: Year Book Publishers, 1926.

For many years the surgical section of The Practical Medicine Series was edited in a noteworthy manner by the late Dr. Ochsner. The present volume, the first appearing under the distinguished editorship of Dr. Evarts A. Graham, continues the high tradition and standard of excellence established by the former editor. In general the plan is the same as in the earlier volumes and consists of abstracts of articles dealing with advances in the various fields of surgery and allied subjects. After many of these abstracts the editor has appended interesting notes gleaned from his own experience or reading.

**HARELIP AND CLEFT PALATE.** Cheiloschisis, Uranoschisis and Staphyloschisis. History, Etiology, Development, Anatomy, Physiology, Types, Surgical and Nonsurgical Treatment, and Reported Cases. By Matthew N. Federspiel, D.D.S., M.D., Prof. of Oral Surg., Marquette Univ. 8vo. \$5. Pp. 200; illus. St. Louis: C. V. Mosby Co., 1927.

For many years the author has devoted himself to a study not only of the operative procedures, but also of the end-results following treatment for harelip and cleft palate. He has observed that even though technically the defect may have been overcome, injury to the dental buds or the development of excess scar tissue, has often completely vitiated the effects of the operation. Because of his interests in orthodontia, the author calls attention to the necessity of careful cooperation between orthodontists and oral surgeons in the treatment of these defects. He shows by very carefully prepared sketches and photographs and the report of numerous cases the necessity for determining the limits to which the surgeon should go in his desires to effect radical cure and the limits at which the surgeon must admit defeat and call in the orthodontist for the application of prosthetic appliances or other conservative measures. In the consideration of the surgical treatment the usual operative procedures are carefully outlined and well illustrated. The value of the volume, however, lies in the evaluation of the work of orthodontist and oral surgeon in the treatment of this unfortunate malformation.—HENRY MILCH.

ÉTUDES SUR LES AFFECTIONS DES OS ET DES ARTICULATIONS. By André Léri, Prof. Agrégé à la Faculté de Méd. de Paris. 8vo. 58 fr. Pp. 460; 128 figs. Par. Masson et Cie, 1926.

The title of the foregoing volume is somewhat of a misnomer. Ostensibly it is a treatise on diseases of bone in articulation. As such it is notably deficient in many important respects. Thus, the whole subject of infections of bones, particularly of the acute type, is completely lacking. The volume completely lacks unity of development and would be much better if entitled so as to suggest a collection of interesting articles on various bone and joint affections which are seen more or less frequently by the orthopedist than to be catalogued as a systematic description of bone and joint disease. Some of the articles, such as the one which the author has designated under the title of Familial Pleonosteosis, represent special interests of the author and are treated at undue length, while bone tumors, fractures, tuberculosis, are treated not at all, or with undue regard for their relative importance.—HENRY MILCH.

A TEXT-BOOK OF MEDICINE. By 130 American Authors. Ed. by Russell L. Cecil, M.D., Assist. Prof. of Clin. Med., Cornell Univ.; Assoc. Ed. for Diseases of the Nervous System, Foster Kennedy, M.D., F.R.S.E., Prof. of Neurol., Cornell Univ. 8 vo. Cloth. Pp. 1400. Phila. W. B. Saunders Co., 1927.

Specialism has grown in internal medicine as in all other departments of medical science. There are many men who have acquired special knowledge of a single disease or group of diseases. Even an Osler could scarce know today all that ought to be told in a complete textbook of medicine. These appear to be the considerations that have given birth to this large single-volume composite work. It is written by 130 contributors, some of them surgeons and most of them professors or teachers in large American medical schools. Each disease description bears the author's name.

As we glance through these 1400 pages, reading many of the sections at random, we have the impression that the contributions are fairly

uniform in excellence, that they have been well edited, and that the choice of authors has been good. It is a large task to secure the interested cooperation of so many authors, to get together and to arrange so many contributions. Curiously, there appears to be no section on tobacco.

## BOOKS RECEIVED

GYNECOLOGICAL DIAGNOSIS AND PATHOLOGY. By A. H. F. Barbour, M.D., LL.D., F.R.C.P., Formerly Lecturer on Gynecology, Univ. Edinb., and Gynecologist, Edinburgh Royal Infirmary; and B. P. Watson, M.D., F.R.C.S. (Ed.), F.A.C.S., Prof. of Obstetrics and Gynecology, Columbia Univ., and Director of the Sloane Hospital for Women, N. Y. Ed. 3. Cloth \$4. 8vo; Pp. 223; 8 col. pl., 201 figs. N. Y.: William Wood & Co., 1927.

PHYSICIANS OF THE MAYO CLINIC AND MAYO FOUNDATION. Cloth. \$7. 8vo; Pp. 578. Phila. W. B. Saunders Co., 1927.

BASAL METABOLISM IN HEALTH AND DISEASE. By Eugene F. DuBois, M.D., Medical Director, Russell Sage Institute of Pathology, etc. Ed. 2. Cloth. \$5. 8vo; Pp. 431; 92 engr. Phila. Lea and Febiger, 1927.

ORGANIZATION UND ORDNUNGSGEMÄSSER BETRIEB DES OPERATIONSSAALS. By Prof. Dr. Max Kappis, Hannover. Paep. M. 4.80. 16mo; Pp. 119; 28 illus. Leipzig: Georg Thieme, 1927.

DIE CHIRURGIE. Eine zusammenfassende Darstellung der allgemein und der speziellen Chirurgie. Ed. Prof. Dr. M. Kirschner and Prof. Dr. O. Nordmann. Part 15. Die Chirurgie der Milz. Die Chirurgie der sog. Blutkrankheiten. By Dr. H. Weinert, Magdeburg. 8vo; Pp. 238; 86 illus., 2 col. pl. Berl. Urban & Schwarzenberg, 1927.

LEHRBUCH DER PHYSIOLOGIE. By Prof. Dr. Emil Abderhalden, Halle. Part 4. Die Motorische System. 8vo; Pp. 648; 211 illus., 1 col. pl. Berl. Urban & Schwarzenberg, 1927.

BIRTH INJURIES OF THE CENTRAL NERVOUS SYSTEM. Pt. I. CEREBRAL BIRTH INJURIES. By Frank R. Ford, Johns Hopkins Hosp. Pt. II. CORD BIRTH INJURIES. By Bronson Crothers and Marian C. Putnam, Harvard Med. School. Med. Monogr. XI. 8vo. Cloth. \$4. Pp. 164; illus. Balt. Williams & Wilkins Co., 1927.

THE INTERNATIONAL MEDICAL ANNUAL A Year Book of Treatment and Practitioner's Index. Forty-fifth Year, 1927. 8vo. Cloth. \$6. Pp. 560; illus. N. Y. William Wood & Co., 1927.

EXPLORATION CLINIQUE ET DIAGNOSTIC CHIRURGICAL. By Félix Lejars, Prof. de Clinique Chirurgicale à la Faculté de Médecine de Paris. Ed. 2. 8vo. Cloth. 120 Fr. Pp. 911; 1094 photographs and new original drawings. Par. Masson et Cie, 1927.



# PROGRESS IN SURGERY

*Selections from Recent Literature*

APPEL, KENNETH E., and BRILL, SELLING, Philadelphia. Post-operative water metabolism and the intradermal salt solution test. A preliminary report. *Ann. Surg.*, April, 1927, LXXXV, 502.

In 1923, McClure and Aldrich first described the intradermal salt solution test. Their method was to inject intradermally 0.2 c.c. of an 0.8 per cent sodium chloride solution and note the disappearance time of the wheal. They found that the normal disappearance time was roughly sixty minutes, but that in edematous conditions (nephritis, cardiac decompensation, anemia) the disappearance time was decreased to as low as three and seven minutes in two cases.

The technique employed by Appel and Brill follows: From a tuberculin syringe 0.5 c.c. of a sterile 0.85 per cent sodium chloride solution is injected intradermally into the skin overlying the peroneal tendons directly above the external malleolus. Two wheals are made about 2 cm. apart and the time required for their disappearance to light touch "unassisted by inspection" is determined. In a small series of normals with this method of injecting only 0.05 c.c., the disappearance time was about thirty minutes—although occasionally some lasted as long as fifty or sixty minutes. Below twenty-five to thirty minutes the authors felt was abnormal; below ten minutes was distinctly abnormal.

The authors have suggested this test as a method for determining the need of the tissues for water postoperatively. This test may be used to show the adequacy of the postoperative introduction of fluids by the various methods.

CARP, LOUIS, New York. Circuminjection of autogenous blood in the treatment of carbuncles. *Arch. Surg.*, April, 1927, xiv, 868.

Various forms of treatment for carbuncle have produced extensive scarring, lengthy convalescence and frequently complicating sepsis or metastatic pus foci. To aid healing and to preclude as far as possible the occurrence of septic complications, two factors are essential: first, the least possible trauma to tissue; and second, the mobilization of the natural forces of defense. Accordingly, Carp injected autoge-

nous blood in twelve patients under the following conditions:

1. The patients were all non-diabetic.
2. The carbuncles were real and progressive and several colleagues agreed that ordinarily their choice of treatment would be radical surgery.
3. Circuminjection of autogenous blood *without incision* was the only treatment. This method has not been attempted before.
4. Post-injection *ambulatory treatment* consisted in: simple dry dressings; no narcotics; the ordinary measures against constitutional symptoms, such as forcing fluids and limited diet; wiping away frank pus, removing separated slough, and keeping the surrounding skin clean.

The technique consists in withdrawing the blood from the median basilic vein into a 20 c.c. syringe and injecting it just beyond the margin of induration of the carbuncle. The needle is pushed into the skin and an intraeutaneous and subcutaneous injection is begun under considerable pressure. Gradually the needle is pushed perpendicularly deeper and deeper until very little pressure is required to force the blood in. The same procedure is followed until the lesion has been circuminjected, using a sterile needle for each injection. It is advisable to allow some blood to well up through the center of the carbuncle. The tissues about the carbuncle are seen to swell up because of the injected blood and a few drops of blood may exude from the punctures. The number of punctures necessary, usually three to six, varies according to the extent of spread. The amount of blood injected varies with the size of the carbuncle and the amount of induration. A short general anesthetic is used.

The following results were noted:

1. The infection did not spread, except in one case.
2. There was quick relief from pain and constitutional symptoms.
3. No post-injection reaction was observed.
4. Most of the slough liquefied.
5. The injected blood seemed to remain in the tissues, with gradual modification, for from several days to two weeks, as evidenced by induration in the injected area, ecchymosis or both.

6. A violaceous color around the carbuncle appeared in an average time of six days. This might have resulted from passive congestion.

7. The time element for cure was probably shorter than by surgical procedure, although it would have been impossible to have had a series of exactly the same carbuncles with surgical therapy as a control.

8. All the cases showed a minimal scar at the time of discharge from the hospital.

9. In 7 of the cases with an average follow-up of twenty-three months, the scar was superficial, minimal, non-adherent, almost invisible in some instances and with negligible induration in 2 cases.

10. There was no recurrence of the infection locally.

The author thinks that the method may be used in other accessible spreading infections. The mechanism of the curative phenomena observed in his cases, he thinks is due to an increased local resistance produced by the body cells, especially the clasmatoocytes. In addition there is an increased action of proteolytic ferments present in the leucocytes and a mobilization of staphylococcus antitoxin locally. The autohemotherapy also plays a rôle.

HARBINSON, J. EDWARD, and LAWSON, JOHN D., Woodland, Calif. The treatment of erysipelas by roentgen ray. *California & West. Med.*, April, 1927, xxvi, 485.

The authors conclude:

1. Roentgen therapy for erysipelas is a valuable form of treatment.

2. Relief is obtained generally within twenty-four hours.

3. The febrile period is shorter than in infections of equal severity treated by other measures and length of illness is shortened.

4. There are, possibly, fewer complications and less chance of spread than in other methods.

5. There is no pain or discomfort attending the treatment.

6. Advanced, serious cases of erysipelas, involving fairly large areas, with high temperature and general infection may be treated successfully.

FRIESNER, ISIDORE, and ROSEN, SAMUEL, New York. Calcium content of pus. Comparison of discharge from ears with and without bone destruction. *J. Am. M. Ass.*, April 16, 1927, lxxxviii, 1231.

Friesner and Rosen find that there is an

astonishingly close parallel between the amount of calcium in the pus from discharging of ears and the presence of suppurative bone disease. Possibly calcium determination of the pus, together with the quantitative determination of other constituents, may become a valuable aid in diagnosing the existence of a destruction of bone due to the suppuration.

MACKENZIE, D., Govan, Scot. The treatment of burns. *Brit. M. J.*, March 5, 1927, 421.

All dead tissues are immediately removed under a general anesthetic—preferably ether. Free removal, both at the skin and deep margin, is indicated. Gauze wrung out of hot hypertonic saline solution (2 to 5 per cent), is then applied in close contact to the raw surface, layer on layer, and covered with wool, or jaconet if the dressing seems to adhere. The gauze is removed by warm saline irrigation. At a later stage when physiological replaces hypertonic saline solution, "v" flap perforated silk is interposed to guard the granulations if required. In most cases within a few days parts of the field are ready for pinch-grafts. A bland ointment is used to protect the rapidly germinating epithelium.

How early the operation should be performed has to be viewed in relation to the degree of primary shock and difficulty which may be met with in estimating the line of demarcation at the particular site of the burn. On the other hand, undue delay must be guarded against for the active measures taken in combating the shock were in part nullified by the rapid absorption of the autolytic products, this absorption from its toxemia sustaining the shock.

The flexible type of scar tissue resulting from this procedure, with its potentiality for plastic considerations and minimum of contractures, lessens disfigurement.

DAVIDSON, EDWARD C., Detroit. The treatment of acid and alkali burns. An experimental study. *Ann. Surg.*, April, 1927, lxxxv, 481.

The results obtained in the treatment of experimentally produced alkali and acid burns were decidedly better when the caustic agent was removed by dilution with water than when rendered inert by neutralization.

When treatment by neutralization is employed, it should be used only after the maximal amount of the caustic has been removed by thorough washing.

HARMS, HELENE, Hamburg. Changes in the sella turcica in cerebral tumors. (*Veränderungen am Türkensattel bei Hirngeschwülsten*). *München. med. Wchnschr.*, Feb. 18, 1927, lxxiv, No. 7, 274.

The author calls attention to the fact that enlargements of the roentgenogram of the sella turcica do not necessarily mean pituitary tumors unless they are associated with the signs of bitemporal hemianopsia and dyspituitarism. Practically all tumors of the brain, and indeed all lesions which cause increase in intracranial tension, will lead to an absorption of the posterior clinoid processes. In these latter cases, however, there will usually be found the other evidences of increased cranial tension such as choking of the optic disc, changes in the rate of the pulse, variation in blood pressure, etc.

VILLARET and BAILBY. The future of patients with cranio-cerebral wounds (*L'Avenir des Traumatisés Cranio-cérébraux*). *Presse méd.*, March 5, 1927, No. 19, 289.

Through the records of the Minister of Pensions, the authors have been able to follow 500 patients who suffered cranio-cerebral injuries during the war. They come to the conclusion that the prognosis in cases of this sort must be very guarded and that late results of such wounds may not manifest themselves until as late as ten years after the initial injury. The late mortality in these patients is low and when it does occur is due to the formation of a brain abscess. About 26 per cent of all such cases seem to show either an aggravation of their original symptoms or the late development of headaches, epilepsy or some sort of motor trouble. The appearance of such troubles seems to be associated with the presence of an unrecognized subdural hematoma. In this is to be found the explanation of the curious fact that patients suffering injuries to the dura mater were less liable to late symptoms than those who had merely an injury to the inner or outer tables of the skull. The fact of cerebral injury appears to render the prognosis much gloomier than in the other types of injuries.

DE LAMOTHE, G. DUTHEILLET., Limoges. Surgical treatment of rebellious neuralgias of the superior maxillary nerve. (*Traitement chirurgical des neuralgies rebelles du nerf maxillaire supérieur*). *Presse méd.*, March 9, 1927, No. 20, 307.

The author describes his method of treating neuralgias localized to the distribution of the superior maxillary nerve. The procedure consists of a removal of the nerve from the inferior orbital foramen to the base of the skull. The operation is entirely intraoral and is carried out largely under local anesthesia. The technique involves a removal of the anterior wall of the maxillary sinus through an intraoral incision and a gradual removal of the canal lying in the roof of the sinus in which the maxillary nerve courses. This permits the nerve to drop down free in the sinus whence it is picked up and torn away from its attachment to the main ganglion. Up to the moment of the actual tearing away of the nerve, the anesthesia is entirely local. At this moment, a whiff of gas is given. The results are satisfactory and the only danger is that of infection of the orbital tissues from the sinus. If the sinus is carefully drained and if a careful prophylaxis of the mouth precedes the operation, the author believes there is no great danger. A description of the points of anatomical interest is given in quite some detail and the technique of the different steps is also detailed.

The author has operated on five patients with varying success. He believes the results have not been watched for a sufficiently long period of time to pass a final opinion. He recommends, however, the operation he describes for it is not as radical as the serious intracranial operations performed for this condition, while it is at the same time much more radical than the simpler methods of injection.

ROBEY, WILLIAM H., and FREEDMAN, LOUIS M., Boston. The effects of tonsillectomy on the acute attack and recurrence of rheumatic fever. *Boston M. & S. J.*, April 14, 1927, cixvi, 595.

The authors conclude:

1. That complete enucleation of the tonsils offers the best preventive of rheumatic fever, and therefore of rheumatic heart disease. That it will prevent every case of rheumatic heart disease is beyond their expectation.

2. A history of repeated sore throats is of more importance than tonsils which by appearance suggest disease. Repeated sore throats, even with tonsils of normal appearance call for tonsillectomy.

3. If the tonsils are diseased in appearance, they should be enucleated even in the absence of sore throats.

4. Physicians should have a thorough understanding of the insidious signs of acute rheumatism in its earliest stages, remembering that the disease has wide differences from that in adults.

5. Tonsillectomy is a major operation and should be performed only by persons duly qualified by training and experience.

6. Incomplete tonsillectomies leave the patient in as dangerous a situation as before, and throw discredit upon the value of tonsillectomy as a preventive. Tonsillar remains are often as formidable as the original tonsil.

7. Some writers argue that rheumatic heart disease appeared after tonsillectomy had been performed and therefore tonsillectomy failed as a preventive. It must be remembered that rheumatic heart disease may not declare itself until three or four years after an attack of tonsillitis or rheumatic fever. Even a late tonsillectomy will often prevent subsequent attacks and damage to the heart.

8. The prompt subsidence of fever and joint symptoms following tonsillectomy in cases of acute rheumatic fever has greatly encouraged the authors to resort to the operation as soon as convinced that the tonsil is the port of entry. Since operation during the height of the febrile attack has not proved disastrous, in their hands, they hope that it will diminish the possibilities of cardiac involvement.

BALLON, DAVID H., and BALLON, HARRY C., Montreal. The effect of injection of lipiodol and the rate of its disappearance, in normal and diseased lungs. *Canad. M. Ass. J.*, April, 1927, xvii, 410.

Over one hundred cases have been studied in this series. Lipiodol is not harmful to the healthy lung, produces no immediate untoward reaction in man or animal, and persists longer than in the diseased lung. The rate of the true elimination in the normal and pathologic lung is influenced by the lipolytic activity of the lung; disappearance from the bronchial tree is dependent on cough, posture, and other factors.

In pulmonary tuberculosis of the exudative type, and in tuberculous pneumonias, immediate reactions were produced and its persistence produced ill effects. These patients should not be injected. Selected cases of the surgical type of pulmonary tuberculosis are usually suitable cases for injection and do not produce any reactions.

In the presence of empyema, pneumothorax,

or an adherent diaphragm which has little respiratory excursion, the rate of disappearance of lipiodol is delayed.

Roentgenograms showed that over 50 per cent of the patients swallowed some lipiodol. No iodism was noted.

OEDER, JÜRGEN, Dresden. The treatment of surgical tuberculosis with horse serum injections (*Zur Behandlung der chirurgischen Tuberkulose mit Tierserumeinspritzungen*). *München. Med. Wchnschr.*, Feb. 11, 1927, lxxiv, No. 6, 240.

The author reports several cases in which marked clinical and roentgenographic improvement was noted following the injection of horse serum. The serum is injected intramuscularly on alternate days. The first dose consists of 0.2 c.c. which is increased by 0.1 c.c. until a maximum of 2 c.c. is given at each injection. Of 4 cases reported, 3 were doing well after intervals varying up to four years. The fourth case died of a tuberculosis meningitis five years after the last injection was given. The authors do not attempt to obtain any general reaction. It was observed that following the injections, von Pirquet reactions which had been negative became positive. They do not attribute the good results to any specific action of the serum but believe they are solely caused by non-specific reactions.

BORCHARDT, DÜNNER, and MECKLENBURG, Berlin. Surgical treatment of bilateral pulmonary tuberculosis (*Zur chirurgischen Behandlung der doppelseitigen Lungentuberkulose*). *Med. Klin.*, Jan. 28, 1927, xxxiii, No. 4, 123.

In cases in which both sides of the lung show equal and extensive pulmonary involvement, pneumothorax is to be performed on the one side and phrenicectomy on the other. If the side shows slight tendency toward sclerosis, phrenicectomy should be performed on that side. Where one lung is completely involved while the other side shows only a basilar lesion, the latter side is to be treated by phrenicectomy; where one side contains a cavity, pneumothorax. In bilateral cavity formation, pneumothorax is to be performed on the worse side. Where one side has been treated by pneumothorax and the second previously healthy lung becomes involved, phrenicectomy is to be performed on the second side. Where pleural adhesions prevent the establishment of



a pneumothorax, phrenicectomy is to be undertaken. Pneumothorax should be attempted first so that in case of failure, phrenicectomy may be undertaken. At a sufficient interval after the first, a second phrenicectomy may be established in cases where pneumothorax is impossible. In cases of bilateral tuberculosis, the pneumothorax refills should be smaller in amount and be at more frequent intervals than in simple pneumothorax.—HENRY MILCH.

PIOTET, G. and URECH, E. Roux's thoracoplasty (*La thoracoplastie de Roux*). *Rev. méd. de la suisse Rom.* March 16, 1927, xlvii, 239.

The authors report on 31 cases of thoracoplasty performed in cases of pulmonary tuberculosis. They insist that the only indications for this operation are severe unilateral progressive forms of the disease in patients who have first been subjected to long periods of medical treatment and in whom several attempts at pneumothorax have been unsuccessful. Of the 31 cases treated by the thoracoplastic method suggested by Roux, 4 died within the first few days as a result of various complications. Of the 20 cases that could be followed over a long period of time and in which late results could be observed, 13 or 65 per cent showed a marked improvement. The authors conclude that this extensive operation is warranted in the type of case which they have designated but that results in other types are not as satisfactory.—HENRY MILCH.

SPURLING, ROY G., Louisville, Ky., and WHITAKER, LESTER R., Boston. End-results of cholecystostomy as shown by the cholecystogram. *Surg., Gynec. & Obst.*, April, 1927, xlv, 463.

Cholecystograms were made on 12 patients at varying intervals, following cholecystostomy. Not one of them showed a normally functioning gall bladder as demonstrated by the cholecystogram.

Six of the patients experienced a return of symptoms severe enough to necessitate surgical relief. Four of these showed a recurrence of gall stones at operation; the remaining two showed fibrosis and thickening of the gall-bladder wall, the microscopic diagnosis in all cases being chronic cholecystitis.

Laboratory experiments were undertaken to study the effect of different types of injury to the gall bladder upon subsequent cholecystograms and thus to obtain further evidence as

to the significance of the findings in those patients in whom no operation was performed. It was found that a severely damaged mucosa prevented shadow formation, and that injury to the musculature of the gall bladder inhibited emptying after the ingestion of fat, the conditions being as nearly comparable as they could be made to the cholecystic disease in the patients not subjected to operation.

It is concluded that the drainage of a diseased gall bladder with the expectation that it will regain its normal function is not only a futile procedure but one that endangers the future health of the patient.

JONES, NOBLE WILEY, and JOYCE, THOMAS M., Portland, Ore. Further remarks on infection of the gall bladder in relation to chronic (pernicious) anemia. *Am. J. M. Sc.*, April, 1927, clxxiii, 526.

The authors thus conclude this further study of the subject:

1. In every case of pernicious anemia with which they have personally worked during the time of this study, a chronic infection of the gall bladder has been positively demonstrated.

2. A small group of cases, which resembled mild pernicious anemia, possessed the same type of biliary infection, and on its removal the patients were restored to fairly normal health.

NEAL, KEMP P., Raleigh. Incomplete duodenal obstruction or chronic arterio-mesenteric ileus. *South. M. & S. J.*, Mar., 1927, lxxxix, 159.

Incomplete and intermittent duodenal obstruction from pressure over the third portion of the duodenum resulting from traction on the root of the mesentery in certain cases, explains many gastrointestinal symptoms which cannot be explained by any other physiological or pathological factors.

These symptoms are more common in thin, nervous, flabby individuals, and are associated with general visceroptosis usually.

Non-operative methods of treatment in cases where there is not sufficient duodenal dilatation to produce duodenal stasis usually give relief. For those cases where marked dilatation of duodenum with stasis is found, duodeno-jejunosomy has been found necessary to give relief.

DWIGHT, KIRBY, New York. Benign hypertrophy of the stomach and linitis plastica. *Ann. Surg.*, May, 1927, lxxxv, 683.



As formerly used, the term *linitis plastica* designated all the conditions of hypertrophy and induration of the stomach which were not obviously malignant.

As now used it refers to a group of cases, probably malignant with a definite micro-pathology, but with a disputed interpretation of that pathology. It separates the cases of evident malignancy from those clearly benign.

The benign can be subdivided into cases of hypertrophic pyloric stenosis; fibromatosis; cirrhosis; chronic inflammation; syphilis, etc.

The cases reported in this article are probably examples of chronic inflammation.

All these benign conditions may resemble *linitis plastica* and one another to such a degree that careful microscopical examination is necessary to differentiate them.

When the lesion is confined to the pyloric half of the stomach the x-ray picture closely resembles that of carcinoma of the pylorus, and the operation is likely to be undertaken under that diagnosis.

In this condition it is impossible to tell, at the time of operation, whether one is dealing with a benign or a malignant process.

In the opinion of the author a partial gastrectomy with a Polya anastomosis is the operation of choice under these circumstances.

STENBUCK, JOSEPH B., New York. Causes of death following operations for perforated gastric and duodenal ulcers. *Ann. Surg.*, May, 1927, p. 713.

The time which has elapsed between the time of rupture of a perforated gastroduodenal ulcer and the time of repair is the most important factor in determining the fate of the patient. There are, however, other factors of considerable importance: age, the type of operative procedure, the repair on the part of the omentum, the size of the perforation, the amount of gastric or duodenal contents spilled, organic disease, and alcoholism.

After operation death occurs in three distinct groups. In the first group, death occurs within three days, usually within twenty-four hours, after operation, and is due almost entirely to the element of shock. In the second group, the patients appear to be improving, only to succumb to diffuse peritonitis in approximately a week after operation. In the third group, the patients after overcoming the elements of both shock and peritonitis die in several weeks

or months after operation, due to subphrenic or liver abscess.

SOUTHAM, A. H., England. Mule-spinners' cancer: clinical features and treatment. *Brit. M. J.*, Feb. 26, 1927, 366.

It appears likely that certain individuals possess a peculiar susceptibility to the irritant effects of mineral oil. Of the 25,000 adult males engaged in mule-spinning approximately 2.5 per 1000 develop the disease.

Within a recent period cancer of the scrotum and skin has come to be recognized as being associated with the occupation of mule-spinning in cotton mills. The lesion on the scrotum is a cutaneous epithelioma similar to that arising elsewhere. It is commonly seen in men between forty and sixty years of age. The first manifestation is a wart-like excrescence or a flat plaque due to local hyperplasia of the epithelium. This wart or papule is usually single and about the size of a pea; it is raised above the surface and may be covered with scales, which the man removes by scratching, leaving a small bleeding surface over which the scales soon re-form. The only symptom which troubles the patient at this stage may be itching. In other cases there may have been several small papillomas on the scrotum, and one of these takes on the above characteristics while the others remain benign. Later the growth sloughs and definite ulceration follows in six to twelve months, when the patient seeks medical advice on account of the irritation and discharge.

When fully developed the tumor is proliferative, of the cauliflower type, with a raised everted and indurated edge surrounding an ulcer. The ulcer is of relatively slow growth and rarely involves the deeper structures.

The tendency to form metastases is at first slow and malignancy is not great. In the initial stages the enlarged inguinal glands do not necessarily contain carcinomatous deposits; the enlargement may be purely inflammatory. Sooner or later, malignant invasion of the glands is bound to occur, and the most conspicuous feature is the breaking down of the glands in the groin. The disease at first and for a considerable time is purely local, and there is ample time both for diagnosis and treatment before it has spread to other parts.

The treatment of this disease is essentially surgical. All forms of radiotherapy have proved disappointing.

When a definite ulcer is present a wide operation, consisting of removal of the growth with a healthy margin of skin and excision of the lymph-bearing areas in both groins, should be carried out. It is necessary to remove only the scrotal ulcer and skin around it; deeper dissection is not required if the whole thickness of skin and dartos be excised. The glandular areas require more extensive dissection. The incision should extend from the spine of the pubes to the anterior superior spine of the ilium with a convexity downwards. The whole mass, consisting of fat, glands, and lymphatic vessels, is dissected out from above downwards in one piece, the dissection extending above Poupart's ligament. The upper three or four inches of the saphenous vein are removed also. All the glands and fatty tissue in Scarpa's triangle are thus excised and the femoral vessels stripped clean. These wounds are closed without drainage, and if the glands have not broken down should heal without any difficulty. There may for a short time be an escape of lymph from these incisions, owing to the division of the lymphatic channels, but this soon ceases. Edema of the lower limbs after operation, due to the same cause, is sometimes troublesome, but, in the absence of infection, clears up in a few months.

Prophylactic application of roentgen rays has been given as a routine after operation for about twelve months.

GERSTER, JOHN C. A. New York. Phlegmonous gastritis. *Ann. Surg.*, May, 1927, lxxxv, 668.

Phlegmonous gastritis is a rare condition, the varieties and pathogenesis of which are becoming more clear as material accumulates.

It may be assumed that there are: (a) Mild cases in which recovery may occur without the condition being recognized; (b) Fulminant types, ending in death within a few hours; (c) Acute cases, running a course to two or three weeks, usually with a fatal outcome, but occasionally undergoing spontaneous recovery with more or less protracted convalescence; (d) Subacute, chronic forms which may simulate neoplasms, the less extensive types of which may lead to cicatricial changes in the gastric wall, depending on their extent and location.

Cures reported following palliative surgery, such as local drainage or gastroenterostomy, may be considered spontaneous recoveries.

Resection is the operation of choice when feasible. It gives a higher mortality in recent

cases than in those which have lasted for some time before reaching the surgeon.

Postoperative phlegmonous gastritis is probably of more frequent occurrence than is realized, and hence it is advisable to make microscopical examinations of tissues from the region of anastomoses in all cases coming to autopsy.

BUTKA, HERSEL E., Los Angeles. Chronic appendicitis. A study of 202 consecutive cases. *California & West. Med.*, April, 1927, xxvi, 467.

Chronic appendicitis often is a clinical condition resting more on a functional than a pathological basis.

Obliterative and atrophic appendices are the result of previous acute pathological processes and are not found in increased numbers in cases diagnosed clinically as "chronic appendicitis."

Eosinophiles in the mucosa of the appendix are no indication of chronic appendicitis, but are probably a link in the defensive mechanism and are normal.

Eosinophiles and leukocytes in the submucosa and muscularis are positive evidence of inflammatory changes in the appendix.

Chronic appendicitis cannot be determined in more than an extremely small percentage of instances by the histological examination alone.

Complete data on gross findings at operation are essential to a correct diagnosis.

MICHEL, DE LAVERGNE, and ABEL, Nancy. Etiology of gangrenous appendicitis. (*Étiologie de l'appendicite gangreneuse.*) *Arch. d. mal. de l'app. digestif.*, Jan., 1927, xvii, No. 1, 4.

As a result of their experimental studies as well as their clinical experiences, the authors come to the conclusion that suppurative and gangrenous appendicitis are due to the same original mechanism. There is first some disturbance in the vascular supply to the organ which predisposes to an inflammatory process. Subsequently, depending upon whether the organisms belong to the pyogenic group or are of the obligatory anaerobic variety, the inflammatory process presents the appearance of suppuration or gangrene. In the latter case, there has usually been thrombosis of the vessel supplying the area involved in the gangrene. The anaerobic bacteria because of their relatively low virulence are to be looked upon as secondary invaders.—HENRY MILCH.

CURCHOD, H. Generalized echinococcus infection of the peritoneum cured by salvarsan. (*Echinococcose péritonéale guérie par arsénobenzol.*) *Rev. Méd. de la Suisse Rom.*, March 16, 1927, xlvii, 152.

The author reports the case of a woman aged fifty-two who at operation was found to have a generalized echinococcus infection of the peritoneum. In despair the operator closed the abdomen and began a course of arsénobenzol. Subsequently the patient was operated upon for an echinococcus abscess of the liver which later resulted in an hepatic fistula. Ten years later the patient was admitted to the hospital and operated upon for an empyema from which she died. At autopsy, the peritoneum was found to contain a number of fibrotic nodules which were evidently the scarred remnants of the echinococcus cysts. There was no sign of echinococcus infestation in the peritoneal cavity.—HENRY MILCH.

DAVIES, REGINALD, Sydney, Australia. Wandering endometrioma. *Med. J. Australia*, March 12, 1927, i, 373.

Davies reports a case of extensive pelvic endometrioma. On opening the abdomen all that could be seen of the uterus was a small portion of the anterior wall. The sigmoid flexure from the left and the cecum and appendix from the right appeared pulled downwards and towards the midline and plastered on to the posterior surface and on top of the fundus uteri and to the back of the inner portion of both Fallopian tubes.

The peritoneum of the bladder appeared "caught up" on to the lower portion of the anterior surface of the uterus.

Showing through the line of junction were numerous dark spots and blisters looking like small cysts of peritoneum containing blood-stained fluid.

It was soon evident that there was no such thing as a line of cleavage and it was only by scissors that Davies was able finally to separate the intestine from the uterus. It was then seen that both tubes and ovaries were bound down in the general mass of very firm adhesions. Both tubes were very much enlarged and both ovaries were polycystic and the cyst contents were dark fluid. One cyst in the right ovary was the size of a small orange. The appendix was first removed and it was noticed that the bowel wall at the base of the appendix was very much thickened.

A panhysterectomy with double salpingo-oophorectomy was performed except for a small portion of healthy appearing left ovary which was left *in situ*.

On section it was seen that both anterior and posterior walls of the uterus were much thicker than normal and that the posterior wall especially was the seat of a growth which was not encapsulated; the cut surface showed numerous cysts containing dark fluid.

SCHWARZ, O. H., St. Louis. Endometrial tissue in the abdominal scar following cesarean section. *Am. J. Obst. & Gynec.*, March, 1927, xiii, 331.

The source of the endometrial tissue in these cases is undoubtedly an implantation from the endometrium of the uterus during the operative procedure. Schwarz observed on two occasions in studying the cesarean scar of the human uterus endometrial tissue along the line of incision. In an experimental study on the cesarean scar in the guinea-pig, endometrial tissue was found in several cases along the line of incision, as well as on the peritoneal surface of the uterus. Additional clinical reports may prove that this can just as readily occur in the human.

If this condition proves to be at all frequent, it may be another point in favor of the low cervical incision in which locality the uterus is lined chiefly by the cervical mucosa, with the possible exception of the extreme upper limit of the incision.

FEREY, DANIEL, Paris. New indications for resection of the presacral nerve. (*Nouvelles Indications de la Résection du Nerve Présacré.*) *Presse méd.*, Feb. 19, 1927, No. 15, 227.

Cotte and Dechaume recommended resection of the presacral nerve in intractable dysmenorrhoeas, pelvic neuralgias, parametritis, etc. Ferey advises this operation in cases of inoperable carcinoma of the pelvis, e.g. in carcinoma of the rectum, the uterus, etc. where the pain is intolerable and frequently uncontrollable even with large doses of opiates. The author reports 6 cases in which this operation offered relief and indeed complete freedom from pain without the subsequent use of any narcotic.

The technical steps involved are relatively simple. The abdomen is opened through a median hypogastric incision and the posterior parietal peritoneum at the level of the 5th lumbar vertebra reflected. The presacral nerve is

derived from the sympathetic plexus and is usually found crossing the left common iliac just within the bifurcation of the aorta. The nerve is isolated and about 1 cm. resected. Occasionally, there are several accessory fibers running parallel to the main branch. If these are not cut, the result may be only partially satisfactory.—HENRY MILCH.

PHANEUF, LOUIS E., Boston. The obstetric future of women delivered by the low or cervical Cesarean section. *Am. J. Obst. & Gynec.*, April, 1927, xiii, 446.

From a series of 41 repeated cervical cesarean sections are drawn the conclusions:

1. Perfect healing of cervical scars and impossibility to locate previous line of incision.
2. Definite protection against rupture in subsequent pregnancies and labor.
3. Delivery through the natural passages is possible in many parturients if no disproportion exists. This applies to cases where an abdominal delivery for a relative indication existed with a previous pregnancy. Four patients delivered through the pelvis after a cervical cesarean, one of them three times.
4. The dictum "once a cesarean always a cesarean" does not necessarily hold with this type of operation.
5. The operation may be repeated with ease.
6. No difficulty was encountered in the separation of the bladder a second, third or fourth time with one exception, when the segment was firmly adherent to the abdominal wall and the uterus was entered extraperitoneally.
7. Pelvic adhesions are reduced to a minimum except where the Veit-Fromme-Hirst technique is employed, and even these adhesions do not interfere in performing a secondary cervical section.
8. Abdominal herniae were not observed in the 206 cervical operations I performed.
9. The convalescence is more nearly that of a pelvic delivery, as the lack of handling of intestines reduces shock and distention to a minimum.
10. The protection against peritonitis is a definite factor in favor of the low or cervical cesarean section.

HARRAR, JAMES, A., New York. Rectal ether analgesia in labor. Technique and results in 5,800 cases at the New York Lying-In Hospital. *Am. J. Obst. & Gynec.*, April, 1927, xiii, 486.

For several years at the New York Lying-In Hospital the Gwathmey method of rectal ether analgesia in labor has been employed in more than 200 confinements each month, and in over 5,800 cases with very satisfactory results. It gives relief to the agonizing part of the ordeal of labor.

The drugs required are morphine sulphate, magnesium sulphate, quinine and ether. One dose of a quarter of a grain of morphine is used hypodermically with 2 c.c. of 50 per cent solution of magnesium sulphate to prolong the action of the morphine. Half of the quantity of ether required for rectal anesthesia is dissolved in oil with 20 grains of quinine alkaloid, and a four-ounce mixture is instilled into the rectum as a retention enema at an interval following the morphine and magnesium sulphate injection. The ether is slowly and regularly absorbed over a period of several hours. The result in 85 per cent of cases was great relief of pain, and more or less relief in 10 per cent more.

Following the technique described, there were no ill results to the mother, and the usual disadvantages of other methods of easing pain in childbirth—perineal delay and asphyxia of the newborn child—are not in evidence. In comparison with "twilight sleep" the effect produced upon the mother's suffering is very similar in typical cases; but with no inhibition of good bearing-down efforts in the second stage, and with no alarms regarding the respiratory condition of the child at birth. Rectal analgesia especially takes the place of intermittent nitrous oxide gas anesthesia during the last few hours of labor. Being simple it can be used in the home without the service of a skilled anesthetist.

SOUTHAM, A. H., and COOPER, E. R. A., England. Pathology and treatment of the retained testis in childhood. *Lancet*, April 16, 1927, 806.

The authors advocate the transplantation of the inguinal retained testis into the scrotum during the first years of life.

As a result of a careful histological investigation the retained testis has been found very similar to the scrotal organ in early childhood.

Good results after operative treatment are not exceptional, and there is a reasonable prospect that the transplanted testis will acquire the spermatogenetic function at

puberty, provided the organ be placed in the scrotum before morbid changes have occurred.

The chief stages in the operation adopted are carried out as follows: The skin incision is made just above Poupart's ligament and exposes the whole length of the inguinal canal. The external oblique aponeurosis is divided and the spermatic cord and hernical sac then identified. The sac is separated from the cord near the internal ring, transfixed, ligatured, and cut across, when the stump will slide out of view under the fibers of the internal oblique muscle. This completes the first stage of the operation. The fundus of the sac is now drawn up and freed from its attachment to the bottom of the scrotum. The testis is thus mobilized and can be drawn out of the wound. It is handled as little as possible during this and subsequent maneuvers. The constituents of the cord are next separated with the utmost care, and all fascial and muscular bands stripped up to the internal ring, the cord being put on the stretch. This is a somewhat tedious performance, but is of the utmost importance. The testis finally is held only by the vas and spermatic vessels, and the latter are traced by the finger into the retroperitoneal tissue towards their origin from the aorta and separated from surrounding structures. Similarly, the vas is followed down into the pelvis and further mobilized. The cord having been sufficiently lengthened by these manipulations to enable the testis to be placed in the scrotum without tension, the organ is laid in its new position after a bed has been prepared there for it with the finger. A mattress suture, previously passed through the remains of the gubernaculum and tunica vaginalis below the testis, is tied over rubber tubing outside the scrotum. This anchors the testis into its pouch. There should be no tension on this suture which merely steadies the testis for a time in its new position. The wound is then closed and the patient remains in bed for three weeks.

When the testis can be transplanted into the scrotum with its blood supply intact and not under tension the organ will remain there and develop satisfactorily. An operation is considered to be an anatomical success when the testis maintains its position in the scrotum and hangs freely without adhesions around it. The organ must be of normal consistence and continue to grow as the age of the child increases. The actual height at which the testis lies in the scrotum is of no great importance,

for normally one organ lies at a higher level than the other. If the testis feels hard and small, fibrosis has taken place and the operation must be regarded as a failure.

WANGENSTEEN, OWEN H., Minneapolis. The undescended testis. An experimental and clinical study. *Arch. Surg.*, Mar., 1927, xiv, 663.

There are a few cases on record in which sperm production or children have followed marriage after bilateral orchidopexy in the father.

The testes of adult dogs have been placed in the inguinal region and the peritoneal cavity. Loss of the germinal epithelium always follows. These changes are not observed in the pre-puberty dog's testis when placed under similar experimental conditions. Ligation of the vas deferens does not result in atrophy of the germinal cells nor in hypertrophy of the interstitium. Replacement of the dog's testis in the scrotum after it has been resident in the peritoneal cavity or inguinal region until most of the germinal epithelium has disappeared (only spermatogonia persisting) will be followed by regeneration of the mature germinal cells and normal spermatogenesis. In the adult dog only a scrotal testis is normal.

Undescended testes in the human adult are practically always aspermatic. These testes, however, do elaborate the mature germinal cells, but the aberrant position of the testis does not permit of the continuance of spermatogenesis. If placed in the scrotum without vessel damage before puberty, the undescended testis will develop normally. Ligation of all the vessels to the testis with the exception of the artery and vein accompanying the vas deferens is followed by destruction of the testis. Scrotal fixation does not minimize the possibility of an undescended testis becoming malignant. Castration in the absence of complication is too radical a therapy in the management of undescended testes.

The author emphasizes:

1. The undescended testis owes its imperfection to its position.

2. Scrotal fixation of the undescended testis in its physiologic position before the histologic changes incident to puberty occur will enable it to develop normally.

REITTERER, ED., Paris. Evolution of a monkey testicle grafted on the human (*Évolution d'un testicule de singe greffé à l'homme*). *J. Urol.*, February, 1927, xxiii, No. 2, 102.

Retterer reports on a case of a man in whom a monkey testicle was grafted in the approved manner. Examined several years later, this testicle showed gradual replacement of the specific cells by fibrous tissue and a complete loss of specificity. Retterer comes to the conclusion that in order to be permanently "rejuvenated" a number of monkey grafts must be made at intervals, when it may be presumed that the previous graft has degenerated. He concludes further that though these grafts are of value for temporary stimulation of debilitated tissues, the hope of achieving permanent results by this method is illusory.—HENRY MILCH.

HERTZ, J., Paris. Remarks on adrenalectomy. (*Remarques sur la surrénalectomie*). *Presse méd.*, March 12, 1927, No. 21, 323.

Adrenalectomy has been advised in cases of epilepsy, essential hypertension, endarteritis obliterans, and thrombo-angiitis obliterans. Adrenalectomy has been practiced through the lateral, the abdominal and the lumbar routes. The author prefers the method which he has described. This consists in a subperiosteal resection of the twelfth rib and a lumbar removal of the left adrenal. By this approach, adequate exposure of the adrenal is afforded without danger. He cautions against seizing the adrenal after exposure because of friability, and recommends careful ligation of the pedicle before any attempt at removal.—HENRY MILCH.

PATEL, CREYSEL and VACHEY, Lyons. The lateral paraperitoneal incision in renal surgery (*L'incision parapéritonéale latérale en chirurgie rénale*). *Presse méd.*, January 29, 1927, No. 9.

The authors advocate the use of the lateral paraperitoneal incision in renal surgery because of the following advantages: It permits the patient to lie in the usual dorsal position and so renders anesthetization easier. It permits of ligation of the vascular supply of the kidney before removal, and allows careful observation of the whole of the kidney bed. It is especially useful in the treatment of hydronephrosis, tumors of the kidney, tuberculosis and horse-shoe-shaped kidneys. The incision consists of two main parts, a long longitudinal incision extending from the anterior extremity of the 10th rib to the level of the anterior-superior iliac spine, and two oblique arms extending from either end of the longitudinal incision.

The muscles are divided in the same plane and the renal lobe exposed. In case of necessity, drainage may be made through a counter-incision in the loin. Closure is made in layers in the usual manner.

ASCHNER, PAUL W., New York. Thrombosis and thrombophlebitis of the renal vein. *J. Urol.*, March, 1927, xvii, 309.

In the cases of thrombophlebitis of the renal vein presented here it is evident that blood stream invasion may occur in renal infection, as in the case of other organs, by the production of a secondary acute thrombophlebitis, and that the kidney can in this way act as the source for metastatic suppurative foci.

The experience with the clinical features and the behavior of the bacteremia in thrombophlebitis of the renal vein has been insufficient for the establishment of reliable diagnostic criteria. It is important, however, for the surgeon to know that this grave complication of renal infection exists, that the kidney can act as a source for metastatic lesions, and that in dealing with the "surgical kidney" it is well to divide the vascular pedicle as far from the organ as is commensurate with safety. The pathologist should bear the condition in mind, for the renal vein frequently escapes adequate scrutiny, and perhaps a more careful study of surgical kidneys will reveal involvement of venous radicles in the parenchyma as a rational explanation of blood stream invasion in these cases.

HELLSTRÖM, JOHN, Göteborg. A contribution to the knowledge of the relation of abnormally running renal vessels to hydronephrosis and an investigation of the arterial conditions in 50 kidneys. *Acta Chir. Scandinav.*, Feb. 22, 1927, lxi, 289.

The author relates two cases of hydronephrosis where, at the operation, a vascular stalk, crossing the ureter, caused obstruction to the outflow of the urine from the renal pelvis. He has critically reviewed the published cases in which abnormally running renal vessels had been considered the cause of the ureteral compression and the dilatation of the renal pelvis, and further investigated the vascular condition in 50 kidneys post mortem. He arrived at the following conclusions:

The reasons usually given that hydronephrosis had arisen on account of ureteral compression through abnormally running renal vessels are partly based upon the findings at operations



or autopsies and partly upon merely ligating the vessel, resulting in freedom from pains, increased renal function and partly retraction of the dilated pelvis. These reasons cannot exclude the possibility of the renal dilatation having arisen from other causes and that the vessels in a later stage of the hydronephrosis had entered into such relation to the ureter as to cause this to be compressed, whereby still another factor preventing emptying of the pelvis had been added.

There is no doubt that renal vessels, crossing the ureter, have in many cases been the main causation of hydronephrosis, although also in these cases other contributory factors must be considered. Among such factors, the author considers temporary distentions of the renal pelvis of less importance than downward displacement of the kidney. Disappearance of the perirenal fat is probably of great importance, as descent of the kidney is thereby facilitated and the vessels and ureter will be more intimately connected than if surrounded by fatty tissue. A congenitally large and extrarenally situated pelvis probably favors the development of hydronephrosis in the presence of abnormally running vessels.

Anomalies in the distribution of the renal vessels are of very common occurrence, having been present in 46 per cent of the author's cases. From anatomical reason, terms such as "accessory," "supernumerary" or "aberrant" renal vessels should be avoided and such vessels at the most be referred to as abnormally running vessels. It should be noted, however, that all transitions exist between "normal" and the "abnormally running" renal vessels.

The presence of pains does not settle the diagnosis; their intensity and duration are not in proportion to the size of the hydronephrosis. Ureteral catheterization may give useful information but may also mislead. The most reliable information is obtained by pyelograms but even these may lead one astray. To determine, on the basis of a pyelogram, whether a ureteral compression by renal vessels is present, is, at least in some cases, impossible.

Regarding therapy, the choice will have to be between nephrectomy and some conservative measure, particularly resection of the vessel. On division of the vessel the possibility of circulatory disturbances in the kidney cannot be excluded. These are as a rule, however, of such mild nature as to be of no practical importance. Division of the vessel may in

many cases relieve the pains, increase the renal function and, at least to some extent, bring about a reduction of the pelvic dilatation. This procedure should be resorted to in all cases where the renal pelvis has as yet reached no marked dilatation and where no severe infection is present, but even under these circumstances the vessel should be divided, in the case of nephrectomy being contraindicated by a reduced function of the other kidney. In true movable kidney of a more marked degree, nephropexy should be done in addition to division of the vessel and in the case of a kinked ureter, fixed by adhesions, these should be freed. In the case of the other kidney being normal, nephrectomy should be performed in far advanced cases, where only little parenchyma remains and in more severe infections or other changes where even after division of the vessel retention in the renal pelvis is to be expected.

LOWSLEY, OSWALD SWINNEY, New York. The ideal prostatectomy. *Internat. J. Med. & Surg.*, March, 1927, xl, 89.

Lowsley concludes from observations of 558 cases that:

1. The most important item in the care of a case suffering from prostatic disease is suitable drainage until the patient reaches his maximum of renal efficiency.
2. The best kind of preliminary drainage is by means of suprapubic double tube suction.
3. Sacral and parasacral is the most suitable type of anesthesia for prostatectomy. Its advantages are: (a) It is efficient; (b) it allows the patient to take fluids up to, during and immediately after operation; (c) the bleeding is very much less than it is with any kind of general anesthesia; (d) anesthesia persists for several hours after operation making the administration of morphine with its attendant bowel stasis unnecessary in many instances.
4. Perineal prostatectomy is preferred because there does not seem to be so much shock as noted in the suprapubic operation. The technique is described.

DAVIS, EDWIN, Omaha. Perineal prostatectomy under sacral anesthesia. *J. Am. M. Ass.*, March 12, 1927, lxxviii.

One hundred and seven consecutive cases of perineal prostatectomy done under sacral anesthesia are analyzed. There was only one death in the series, a mortality of less than 1



per cent. This patient, aged ninety-one, but apparently well preserved and with good kidney function, did well the first forty-eight hours and then died suddenly after a few minutes of cyanosis and rapid pulse. An autopsy was negative. Out of consideration of the patient's age, this death might, of course, have been avoided by better statistical foresight. This patient was the twenty-second case, leaving a consecutive series of eighty-five not as yet interrupted. Not included in this series are three patients who died following suprapubic drainage, without prostatectomy. One died months later with ascites secondary to myocardial changes. The second death, occurring two weeks after the drainage operation, was due to cardiac decompensation, present at the time of the suprapubic drainage, the latter procedure having become imperative on account of impossible catheterization. The third death was due to acute general sepsis, following faulty urethral instrumentation. There was one case of rectal injury at operation. In this instance a urethrorectal fistula was prevented (as it always may be prevented) by closing the perineal incision and immediately performing a suprapubic drainage, postponing the enucleation of the gland, and thus converting the procedure into a two-stage suprapubic operation. The series includes one case of persistent perineal urinary fistula lasting the better part of a year, and which will probably prove to be permanent unless there is operative intervention. Excepting this one case, the average time of closure of the perineal fistula was twenty-three days. This figure does not include the small percentage of patients whose wounds reopened and drained for a brief period of time after their return home. There are three cases in which the control of urination is not satisfactory. While each of these patients has intervals of complete dryness and has the ability to start and stop the urinary stream at will several times while voiding, there is a weakness of the external sphincter, as indicated by leakage, at intervals, of small amounts on any undue exertion, such as coughing or sneezing or suddenly rising. There were eleven cases of postoperative epididymitis.

TEN BERGE, B. S., Rotterdam. The closure of uretero-genital fistulae in the presence of a pyelitis (*Verschliesung von Ureter-Genital-fisteln bei bestehender Pyelitis*). *Zentralbl. f. Gynäk.*, Feb. 5, 1927, li, No. 6.

In cases of uretero-genital fistulae in which the renal pelvis is not infected, cure can be brought about by simple implantation of the lower end of the ureter into the bladder. When a pyelitis already exists, this procedure cannot be undertaken. In such cases, it is first necessary to drain the kidney. The author has accomplished both the drainage and the implantation of the ureter in a single operation, by the following procedure: The ureter is exposed in the usual manner and freed from the retro-peritoneal tissue down to its insertion into the bladder. A lateral incision is made into the ureter and a catheter is inserted. This catheter is then led through a counter incision in the groin. Thereupon, the lower end of the ureter is implanted into the bladder in the usual manner without fear of injury to the kidney on the same side. When the urine has become clear and infection controlled, the catheter is withdrawn and the ureteral fistula permitted to heal. The author reports a case in which this procedure resulted in cure.—HENRY MILCH.

MARION, G., Paris. Congenital hypertrophy of the vesical neck. (*Hypertrophie congénitale du col vésical*), *J. Urol.*, February, 1927, xxiii, No. 2, 96.

Marion reports 4 cases of what he calls congenital hypertrophy of the vesical neck. All 4 were cured by resecting a small portion of the neck of the bladder. The pathological examination showed normal epithelium and muscle tissue without any of the scar tissue that is usually found. The clinical history of these patients is characteristic. They are usually young men who first notice difficulty in urination at about the end of the second decade of life. They have the frequency, the urgency and the difficulty in passing water that is typical of hypertrophied prostates. On rectal examination, however, no enlargement of the prostate is found. They are cured by removing a small segment of the bladder sphincter with the punch forceps.—HENRY MILCH.

MARTIUS, H., Bonn. The treatment of vesical ureterocele. (*Die Behandlung der Ureterocele vesicalis*), *Zentralbl. f. Gynäk.*, Feb. 5, 1927, li, No. 6.

The author calls attention to the severity of the operative removal of vesical ureterocele. He believes that this condition can better be treated by the use of endovesical diathermy.

In this manner, using a fulguration catheter and a miliamperage of about 200 to 300, the obstruction can be overcome without any pain or inconvenience. A case of bilateral ureterocele is reported in which this method was used with excellent results. The advantage of this method lies in the fact that besides being almost painless to the patient, it may be done with the patient ambulant.—HENRY MILCH.

THOMAS, GILBERT J., and KINSELLA, THOMAS J., Minneapolis. Renal tuberculosis. Preliminary report of a clinical research problem. *J. Urol.*, April, 1927, xvii, 395.

Thomas and Kinsella conclude:

1. Every patient infected with tubercle bacilli is a candidate for renal tuberculosis. The physician and the patient may notice no symptom indicating this infection. Repeated urologic examinations including complete urinalysis and animal inoculation will reveal many unsuspected cases.

2. Tissue destruction with renal tuberculosis or renal phthisis is a late lesion, that is most frequently encountered by the surgeon. The diagnosis and early treatment of the early lesion of renal tuberculosis may prevent the development of renal phthisis.

3. Renal infection with tuberculosis is through the blood stream. Bilateral infection is the rule.

4. The authors have not been able to demonstrate a case of excretory bacilluria.

5. Be sure you know that the patient has one sound kidney before the other one is removed. This may require months of observation and repeated animal inoculation of urinary sediment.

6. Renal tuberculosis may end in clinical arrest or cure.

7. Sanatorium treatment is necessary if renal tuberculosis is to be arrested or cured. This is suggested following the surgical removal of one kidney as well as in the case of bilateral infections.

KOCH, SUMNER L., Chicago. Prevention of contractures following infections of the hand. *J. Am. M. Ass.*, April 16, 1927, lxxxviii, 1214.

Koch asserts that contractures following hand infections may be reduced to a minimum if (1) drainage incisions are made with due regard for important anatomic structures; (2) secondary infection is not added to the primary infection; (3) hot dressings are dispensed with early in the course of treatment

and replaced by the intermittent use of the sterile arm bath and dry heat; (4) movements of the fingers and hand are initiated as soon as the acute symptoms of infections have subsided, and (5) during periods of rest the hand is immobilized in the position of function.

CODMAN, ERNEST, Boston. Obscure lesions of the shoulder; rupture of the supraspinatus tendon. *Boston M. & S. J.*, March 10, 1927, cixvi, 381.

From his experience of a number of years with shoulder affections Codman advocates early exploratory incision in cases of severe shoulder injuries with negative x-ray findings.

Rupture of the supraspinatus tendon especially is seldom recognized and promptly and efficiently treated. There are all degrees of rupture, from a little nick in the tendon to complete evulsion of the supraspinatus and the adjoining parts of the infraspinatus and subscapularis. The biceps tendon is sometimes torn too. The mild ruptures repair themselves but they are slow. The complete ones remain permanently disabled and suffer more than the average fracture case.

The diagnosis is confirmed by exploratory incision, i.e., an inch and a half incision through the deltoid, opening the bursa and rotating the arm to inspect the base of the bursa. A fairly satisfactory repair is made even in long-standing cases. The "saber-cut" incision through acromio-clavicular joint and base of the acromion is advised against unless it is impossible to suture the tendon through the exploratory incision. The chief objection to it is not so much the danger, but the long period waiting for union of the acromion to occur.

In old cases the greatest difficulty has been in controlling the discharge of synovial fluid after the operation. This fluid soaks into the surrounding areolar tissue causing redness and swelling and often an acute febrile condition, and the appearance of a septic wound. Codman found it unwise to leave the fluid out but waited for it to discharge itself; and it may run for days or even weeks.

If the cooperation of the patient is acquired the arm is kept in abduction; if not, in any position the patient can make it most comfortable; and it is weeks or months before good function is obtained in long-standing cases.

If a patient has a severe wrench of the shoulder, and within a day or two can endure passive abduction but cannot perform active

abduction and the x-ray picture is negative, exploration should be done.

The operations here reported on have been done on cases averaging a year after the injury and the results, therefore, have been only good, but Codman thinks that acute cases can get perfect results if operated upon promptly.

SPEED, KELLOGG, Chicago. Recurrent anterior dislocation at the shoulder. Operative cure by bone graft. *Surg., Gynec. & Obst.*, April, 1927, xliv, 468.

In muscular men an incision is made from just below the coracoid process straight down about 4 inches through the skin, superficial fat, and fascia. The edge of the pectoralis major muscle is then identified at the lower angle of the incision. By blunt dissection the left index finger is pushed up under the muscle until its upper border is reached and at the point of junction with the deltoid the finger is hooked through and the muscle is cut transversely across its fibers about  $1\frac{1}{2}$  inches from the tendinous insertion into the humerus.

Retraction of the muscle ends exposes the axillary contents. The nerves and blood vessels are gently held out of the way and the edge of the glenoid fossa is palpated deep in the wound above the axilla. By blunt dissection all important structures being avoided, this glenoid edge is brought into view. The capsule of the shoulder joint is usually not opened.

In women the approach through the delto-pectoral junction across the shoulder usually affords sufficient space upon retraction. A broad drill point or chisel is then inserted into the scapula just anterior to the glenoid edge near its lower margin. A hole is drilled about 1 inch deep diagonally into the neck of the scapula. Into this is inserted a bone transplant removed from the anterior surface of the tibia. The transplant is driven home and about  $\frac{3}{4}$  of an inch is left projecting anteriorly and obliquely across the lower anterior margin of the shoulder joint. This in no way interferes with normal range of shoulder joint motion, but it does prevent the head of the humerus from slipping out forward into anterior and habitual dislocation. The anterior capsule may be exposed and sutured if it is considered necessary as an extra precaution. Any active hemorrhage is checked. The great pectoral muscle is sutured by mattress stitches of heavy catgut, and an accurate re-approximation thus made. The pectoral fascia is then sutured by a run-

ning stitch of lighter catgut, the skin is closed with black silk, and a capillary drain left near, but not exactly at, the lower angle of the wound. The arm is held in a sling close to the chest after the wound is dressed.

Within a week the forearm is removed daily from the sling for elbow joint motions. After twelve to fourteen days, active abduction of the arm is requested, and after three weeks no arm support of any kind is used, abduction of the arm being encouraged. Within four to five weeks after operation the arm can be actively abducted beyond a right angle and full action of the pectoralis major returns. Ultimately complete elevation of the arm becomes possible and no degree of hyperabduction leads to another dislocation. Three cases in which the author used his own operation are reported.

NEGLEY, J. C., Los Angeles. A new use of the phenolsulphonaphthalein test. *J. Urol.*, March, 1927, xvii, 367.

The bladder is washed with sterile water until solution returns clear and is then filled to comfortable tolerance with a 0.5 per cent solution of sodium bicarbonate. The bladder is inspected in the usual manner and while the sodium bicarbonate solution is still in the bladder 1 c.c. of solution containing 6 mg. of phthalein is injected intravenously, the catheterizing telescope, with catheters in position, is introduced, the ureters are visualized and at the appearance of the phthalein deep pink color is noticed when the ureter ejects the urine. This pink spurt is noticed for size, as compared to ureter opening, density of color (comparing the two sides), strength of spurt, i.e., forcible or weak. These observations having been quickly determined, the catheters are introduced in the usual manner and observation is made as to whether there is leakage of the dye alongside the catheters.

*Advantages.* 1. It enables one to find the ureter openings where they are difficult to locate and does not cloud the bladder media as does a few spurts of indigo carmine.

2. In those cases that catheterization, of one ureter, is not possible, it gives one a good idea of the function of that kidney for with the catheter in the opposite side one can measure the size and force of spurt and density of color. Then at the end of any given time, if the bladder is catheterized, we can estimate the phthalein just as if the ureter had been catheterized.

3. It does away with the awkward procedure of catheterization for bladder leakage for if the urine is leaking alongside one or both catheters, it can be visualized and estimations made accordingly.

4. In those cases, having a supposedly dead or only weakly functioning kidney, where it is dangerous to introduce catheters, one can get a very accurate functional estimate of the healthy kidney without introducing a catheter.

5. It is the general rule not to catheterize the ureters of prostate cases on account of the ensuing reaction that sometimes occurs, but with this method one can get a fairly good idea of what each kidney is doing and Negley has saved quite a few prostatitis who had a good bladder phthalein and blood chemistry, but a dead kidney, which probably would have given trouble, if a prostatectomy had been performed.

6. Phthalein seems to appear in the bladder from two to five minutes quicker by this method than that of having it run through the catheters into an alkaline solution thus shortening the time of examination.

**Disadvantages.** 1. In bleeding bladders or hematuria from either kidney, the red or pink color, of the phthalein, only adds to the cloudiness and renders the ureter openings not visible.

2. If difficulty is encountered in introducing both catheters, the phthalein lost between the time of appearance and introduction of the catheters, is often sufficient to cloud the reliability of the entire test.

3. The technique is difficult to master and one must perform the test many times to be able to use it with accuracy and expediency.

MAXWELL, HARVEY CECIL. Spondylolisthesis in males. *Mil. Surgeon*, April, 1927, ix, 438.

Maxwell defines spondylolisthesis as a lumbosacral dislocation of traumatic origin, which, he says, is rare in males. The diagnosis is made on the characteristic deformity, history, and x-ray findings. The treatment is surgical fixation by means of bone splint, if the dislocation can be reduced; if not reducible, a celluloid jacket or brace, which will remove the weight of the trunk from the lumbar spine, offers the patient reasonable comfort.

WILSON, JOHN C., Los Angeles. Surgical treatment of traumatic spondylolisthesis. *J. Bone & Joint Surg.*, April, 1927, ix, 346.

Traumatic spondylolisthesis occurs more fre-

quently in the male than in the female. Severe trauma played an important causative rôle in all of the cases studied, with one exception.

The clinical history and physical signs do not differ materially from those of other irritative lesions of the lumbosacral articulation.

Lateral roentgenologic examination reveals the only positive evidence of the existence of spondylolisthesis.

An attempt may be made to reduce the deformity. This failing, the vertebra should be fixed by surgical measures. Hibbs' spinal fusion offers a satisfactory means of operative fixation in spondylolisthesis.

SONNENSCHNEIN, H. D., New York. Rupture of the quadriceps tendon. Report of four cases. *M. J. & Rec.*, March 2, 1927, cxxv.

Rupture of the quadriceps extensor femoris muscle is a comparatively uncommon injury, much less common than fracture of the patella which is caused by a similar type of violence. Rupture of the quadriceps has never been reported in the young. The degree of disability depends on the completeness of the tear. Usually this tear is not complete, enough fibers remaining intact to permit slight motion of the knee. In establishing the diagnosis one should not be misled by this residual power of extension, as complete transverse tears are unusual and the few intact fibers will function in a small manner. There is considerable swelling of the thigh in the region of the injury; the knee is held in flexion and there is inability to actively extend the leg. A transverse furrow is felt at the point of rupture.

There can be no complete restoration of function unless the muscle is sutured. Kangaroo tendon may be employed but it has no material advantage over chromic gut and has the disadvantage of occasionally giving trouble because of non-absorption. The knee should be hyperextended before the sutures are tied. With the separation occurring at the insertion of the tendon into the patella, the sutures should include the anterior portion of the patella substance. In the cases which are sutured, the limb should be immobilized in a plaster cast for about three weeks, after which active and passive motion should be started.

Guarded active flexion and extension can be started as soon as the skin wound has healed.

CAMPBELL, WILLIS C., Memphis, Tenn. End results of arthroplasty of the hip joint. *J. Bone & Joint Surg.*, April, 1927, ix, 331.

Of 15 arthroplasties for ankylosis of one hip, 11 were in women and only 5 in men; all were in young adults from sixteen to thirty-five years of age, which is the period of life more favorable for arthroplasty.

Of the 15 patients, there have been excellent results in 10, fair in one, doubtful in one. There have been no operative deaths, but one died one year later, and death must be attributed to operation. In only 2 has ankylosis recurred. Of the 10 with excellent results, ankylosis was probably caused in 5 by the gonococcus, which apparently refutes the statement that ankylosis caused by gonococcal arthritis contraindicates arthroplasty.

Of the 10 apparently excellent results, sufficient time has elapsed in 6 to conclude as to durability, which are, respectively, 10 years, 8½ years, 7½ years, 5 years, 3½ years and 3 years. In all cases there is stability, endurance and efficiency.

HAHN, F., Fürth i. B. Early treatment of congenital dislocation of the hip (*Frühbehandlung der kingenitalen Hüftgelenkverrenkung*). *München. med. Wchnschr.*, March 11, 1927, lxxiv, 409.

The author calls attention to the fact already brought out by Lorenz that so-called congenital dislocation of the hip is in reality not congenital but due to abnormal play of muscles about the hip in the post-partum period. He believes that the best way in which to overcome this abnormal muscle action is by early reduction of the dislocated hip. He is of the opinion that in this manner the ill-effects of late treatment are avoided and the period of treatment is materially shortened. He reports several cases in which both unilateral and bilateral dislocations treated under the age of one year were discharged cured in periods of less than four months. He avoids the difficulty of soiling of the casts in these infants by applying a fresh cast every two weeks.—HENRY MILCH.

MALPAS, P., Liverpool. The prognosis in fractures of the os calcis. *Brit. Med. J.*, March 19, 1927, 510.

From a follow-up of 14 out of 25 cases the following conclusions are drawn:

The average period of disability after fractures of the os calcis is eleven months. The length of the period depends on the condition of the subastragaloid joints, and not directly on the amount of bone damage.

When these joints are ankylosed as a result of the fracture the foot improves in six months to an optimum stationary condition, with a limited but painless range of eversion of the foot.

Should the joints escape entirely the prognosis is so much the better, but when an incomplete fibrous ankylosis results from the fracture, improvement is slow and eversion is often permanently attended by pain.

WALTON, RALPH W., Montclair. Leucocytosis accompanying fractures. A study of two hundred and sixty cases. *J. Am. M. Ass.*, April 9, 1927, lxxxviii, 1138.

The clinical observations made by Walton in 260 cases of fracture, show that traumatic injury to bone gives rise to a moderate leucocytosis, chiefly polymorphonuclear in type. This elevation in the white cell count reaches a maximum within twenty-four hours following injury. It remains approximately at this level until immobilization of fragments is secured. Proper reduction of fracture and immobilization of fragments are followed by a rapid fall in the white cell count, which then reaches normal by the fifth or sixth day. Old, debilitated persons usually develop less leucocytic reaction in case of fracture than do children or younger adults. This increase in number of white cells appears to be largely the result of injury to the bone and periosteum but varies also in proportion to the amount of soft tissue injury and displacement of fragments. Skull fractures head the list, with an average leucocytosis of 17,700. Next come multiple fractures; then the larger of the long bones, and last of all, the phalanges, metacarpals and metatarsals, which give a mean white cell count of 9,650. It is evident, therefore, that the rise in number of white cells varied roughly with the extent of the injury. Experience showed that leucocytosis developed immediately following injury, reached a maximum within twenty-four hours, and maintained approximately the same level until after immobilization of the fragments. Following reduction and immobilization, there was a rapid drop in total number of white cells, accompanied by a corresponding fall in the number of polymorphonuclear leucocytes. The condition of properly treated patients may be contrasted with that found in untreated patients who entered the hospital from five to thirty-five days following injury. Only three of the latter patients presented normal white counts (6,800, 7,000 and 7,600,

respectively). The other eleven showed an average count of 11,300.

MAGE, SIGMUND, New York. The use of regional anesthesia by the nerve block method for the reduction of fractures and dislocations. *Ann. Surg.*, May, 1927, lxxxv, 765.

The plan is to block the nerves proximal to the fracture, and, depending on that site, various levels may be available. Thus the reduction of a dislocated wrist-joint may be attempted with either a block of the median and ulnar nerves at the wrist, a block of the median, ulnar, and radial at the elbow, or a brachial plexus block.

Fractures about the ankle are satisfactorily treated by popliteal space block. Fractures and dislocations of the bones of the foot are most satisfactorily taken care of by popliteal space blocks, although metatarsal and phalangeal injuries may be handled by ankle blocks. Fractures of the os calcis which are amenable to correction or reduction should be blocked at the popliteal space to obtain relaxation of the tendo Achillis.

Fractures and dislocations of the phalanges, which require anesthetics for correction have been treated very advantageously by block of the lateral nerves about the base of the finger or toe.

In a series of adaptable fractures and dislocations indicating immediate manipulative reduction, nerve block was found to be satisfactory by allowing painless reduction and by supplying adequate muscle relaxation.

Nerve block is an excellent adjuvant for use in fracture work, and is the indicated anesthetic where any contraindication to general narcosis exists.

LEVINSON, A., Moscow. Autopus therapy (*Autopustherapie*). *München. med. Wchnschr.*, Feb. 11, 1927, lxxiv, No. 6, 241.

The author reports cases of meningococcal meningitis, abscess of the thigh, pulmonary abscess following pneumonia diaphragmitis cured by the intramuscular injection of autogenous pus. Several cases of tuberculosis showed absolutely no reaction. The pus withdrawn from the original focus is injected into the arm or thigh. If the secondary abscess warrants, incision is made and the cavity drained, otherwise the abscess may disappear spontaneously. The secondary abscess seems

to stimulate the protective mechanisms of the body so that the original focus is cured or the process markedly benefited.—HENRY MILCH.

## SUPPLEMENTARY ABSTRACTS ON ROENTGENOGRAPHY AND RADIUM THERAPY

SAMUEL, E. C., BLUM, H. N., and BOWIE, E. R. Roentgenotherapy of exudative iritis. *J. Am. M. Ass.*, 1926, lxxxvii, 1033-1034.

The first observation of the therapeutic effect of roentgen rays upon iritis was in a case due supposedly to trauma in which roentgen-ray exposure was made to determine the presence of a foreign body. There was a large fibrinous exudate in the anterior chamber, and it was noted that rapid disappearance of this spongy material followed roentgen-ray exposure. This happened without the administration of internal treatment, only mydriatics being used to keep the ciliary body at rest and to dilate the pupil fully. Subsequent experience has demonstrated that the above effect was not exceptional. In several different laboratories the results all showed a marked amelioration of symptoms following roentgen therapy with prompt, eventually complete resolution of the lesion.

The cases of iritis that have been treated were of the exudative type, classified in different textbooks as spongy iritis or croupous iritis. The causation in the majority of cases has been syphilitic.

The technique is simple. An exposure is made over the affected eye or eyes for 30 sec. with rays produced by 5 ma., 5 inch gap filtered through 1 mm. Al, distance 20 inches. There is probably no virtue in the prolongation of the time of exposure by the reduction in the milliamperage, except that it seems to make more of an impression on the patient. The amount of irradiation may seem to some ridiculously small since it cannot be considered to total more than one-twentieth of an erythema dose through a millimeter of aluminum. BUMPUS, HERMON C., JR. Carcinoma of the prostate. *Surg., Gynec. & Obst.*, August, 1926, xliii, 150-155.

A summary is given of the clinical study of 1000 cases of carcinoma of the prostate seen at the Mayo Clinic prior to January, 1925, complete records being available for 90 per cent of the cases in this series.

The average age was sixty-five years, and in no case was it encountered before the forty-second year. Neoplasm of the prostate occur-



ring prior to the age of forty should be sarcoma. Frequency and difficulty of urination were given as the usual symptoms, after which there developed pain. Metastasis to the lymphatic system was demonstrable in 243 of the cases. While the lymphatic system without doubt is the earliest and most frequent site of metastatic lesions, they are far easier to detect in the osseous tissue for they are usually of the osteoblastic type and the increase in density of the bone renders them discernible roentgenographically. The most common site of involvement is the sacrum and adjacent portions of the spine and pelvis. Early metastatic lesions are difficult to distinguish from areas of osteitis, and when the latter are found in the sacroiliac region in men of prostatic age, the diagnosis should not be confirmed until careful rectal examination has ruled out the possibility of malignant disease of the prostate.

A more frequent cause of confusion in the more advanced cases is the differentiation from Paget's disease. In the latter, the bodies of the lumbar vertebrae are flattened and widened, and there is increased density without destruction, while with metastases there is little, if any, change in the shape of the vertebrae, but the increase in density is associated with destruction of tissue. In this connection roentgenograms of the head should be studied. Metastases to the lungs were found in a few cases, but for diagnosing the presence or absence of metastases roentgenographically a plate including the spine, pelvis and upper femurs would seem all that is necessary.

Eleven of the patients had metastases to the spinal cord and a number of others showed metastases to the skin, liver and kidneys.

Completed records of 164 cases in which prostatectomy was performed show 21 five year cures. This figure should make one hesitate to recommend surgical treatment when the disease has advanced sufficiently to be positively diagnosed.

Because of the poor surgical results, treatment by radium was tried. At first the method of administration (in the rectum directly over the prostate) was very crude and inefficient, and of 35 patients so treated all but one are dead, and many suffered severely from proctitis. An additional group of 35 was treated by the insertion of radium bearing needles plunged through the perineum. Only 3 of these patients are alive. The average length of life for the group was sixteen months after application of radium, very little longer than for patients receiving no treatment.

In subsequent cases, the radium was applied through the urethra by means of emanation seeds inserted directly into the gland as well as

through the perineum and over the rectal surface. Of 122 patients so treated there are completed records of 112. The average dose was a little over 2000 mg-hr., and the patients lived an average of twenty-two months following treatment. Of these 25 are still alive, 9 more than three years, 4 of whom have lived more than five years. These results are about equal to those obtained by the surgical treatment, considering that these cases were not as carefully selected.

In a few cases prostatectomy followed radium irradiation of the gland, and the results were so poor that the method was quickly abandoned. In other cases radium was administered after prostatectomy when the pathological examination showed little involvement. Here seems to be the greatest field of usefulness for radium in connection with malignant disease of the prostate. Surgical procedure should be such as to expose the neoplasm and make it essentially a surface lesion, thus permitting a more accessible approach for the radium.

Suprapubic cystostomy has been found to be more free from risk, to cause less suffering and to lengthen life more than any other form of treatment thus far tried.

LAHEY, FRANK H. Indications for surgical treatment of goiter. *Radiology*, May, 1926, vi, 368-371.

When malignant degeneration of a thyroid adenoma is diagnosable, it is hopeless surgically. It is here that the author has seen some of the very best results in a palliative way from roentgen treatment. A large number of intrathoracic goiters are located either to one side or the other of the trachea resulting in the deviation of that structure, usually in a curve corresponding to the more or less spherical outline of the adenomatous masses, the roentgenographic demonstration of which is of marked usefulness in the diagnosis of this condition.

The characteristic features of the roentgen picture of intrathoracic goiter are the sharpness of outline of the intrathoracic mass due to the fact that such masses are usually symmetrical in shape in a firm fibrous capsule surrounding. It should be a fixed rule that every nodular goiter be carefully roentgenographed for detecting the possible presence of an intrathoracic mass. All intrathoracic goiters are surgical and should be removed. The author has several times been unable to demonstrate intrathoracic masses roentgenographically but at operation found such masses extending well down into the mediastinum. This is regarded as one of the distinct advantages of the operative procedure done on thyroids for other indications such as toxicity.



Patients have so often been seen to die as the result of deferred and inadequate treatment that the author has arrived definitely at the conclusion that the best form of treatment for a condition as serious as thyroidism is the one which most quickly, most certainly, most completely and most permanently relieves the toxicity, and that is surgery.

TRUEHEART, M. Cancer of the lip—Report of 25 cases treated with radium. *J. Kansas M. Soc.*, October, 1926, xxvi, 311-313.

The series of cases of cancer of the lip here reported were treated at the Sterling Hospital, Sterling, Kansas, between August, 1922 and January, 1925. The treatment consisted of external irradiation of the lip, insertion of needles being applied only in those cases in which the glands were palpably involved. In the ordinary case with small lesion of the lip, the author used four needles containing a total of 44 mg. radiant material screened with 2 mm. Cu and 1 mm. Al. The first treatment lasted forty-eight hours and after the resulting erythema subsided (about three weeks) a second treatment of twenty-four hours was given producing a similar erythema. After a second erythema subsided another twenty-four hour treatment was given. This was almost invariably sufficient to cause the lesion to heal. In involved glands 10 mg. needles were inserted and allowed to remain for ten hours and in addition there was administered an erythema dose of deep roentgen rays over the gland-bearing area of the neck.

Two of the cases had the upper lip involved and both of these have remained well since treatment. The lower lip was involved in 23 cases and of these 2 are dead, 3 have had recurrences and the remainder are well.

The author's experience with radium in the treatment of cancer of the lip shows that it offers as good a hope for curing this disease as any other method of treatment if used as the primary treatment at the time when the diagnosis is first made. It has the advantage over other treatments of being able to salvage some of the cases that have been operated on or have used paste or roentgen rays without cure. The most important item in the cure of this condition is early diagnosis and early proper treatment.

CRILE, G. W. Surgical treatment of goiter. *Radiology*, May, 1926, vi, 365-367.

The plan of management employed by the author is such that almost no case of hyperthyroidism is too severe to warrant surgical treatment. During a period of six months from June 1, 1925, among 748 thyroidectomies for hyperthyroidism the mortality was 0.82 per

cent, and among 398 ligations the mortality was 0.76 per cent. By careful choice of the location of the line of incision the resultant scar is so slight that it becomes practically invisible within a few weeks. The one or two brief stays in the hospital do not inconvenience the patient more than the repeated visits to the hospital for treatment with roentgen rays. In the case of acute hyperthyroidism the patient's occupation should be interfered with and for a sufficient period no matter what the method of treatment may be. The problem of both roentgen therapy and surgery being to diminish the toxic secretions of the gland by diminishing the amount of the secreting substance, it appears to the author that surgery supplies the one method by which the amount of diminution can be definitely controlled. The amount of gland reduction by radiation therapy cannot be measured accurately. The argument of the roentgenologist that if roentgen therapy fails surgery can be employed later fails in one respect, for the difficulties of operation are increased by radiation and during the period of irradiation the disease has wrought additional damage.

FINTON, W. L., and SHAEFFER, A. M. A goitre resumé. *J. Mich. M. Soc.*, 1926, xxv, 338-341.

Surgery is recommended by the authors on an average to only about one goiter patient out of the three (in adults). Only rarely should surgery be recommended in cases under twenty years of age. Roentgen treatments to do any good should be given in fairly good doses and repeated every two weeks, the total being usually from three to six treatments. Radium may be substituted if patients cannot be moved to the roentgen machine. The mode of application of roentgen rays has certain mechanical advantages over that of radium. Opinion seems to be that roentgen rays cause temporary benefit in most cases of mildly toxic goiter.

It is the authors' observation that the patient with a "goiter heart" is a better surgical risk than is popularly supposed. Patients with hyperthyroidism and bad hearts should not be refused surgical relief.

FRAZIER, CHARLES H., and MOSSER, W. BLAIR. A system of control and treatment in the toxic goitre. *Ann. Surg.*, 1926, lxxxiv, 51-56.

A thyroid clinic has been evolved at the University Hospital, Philadelphia, officered by representatives of the medical, surgical and roentgen-ray services; in this clinic all patients with diseases of the thyroid gland are registered no matter on what service they may be entered originally, and on their discharge from the hos-

pital the entire group is subjected to the same continuation of observations.

At the present time, surgical treatment offers to the patient suffering either from exophthalmic goiter or toxic adenoma by far the best hope for recovery. A conservative estimate of operative results from various clinics shows that recovery is to be expected in about 60 per cent of cases; improvement in 30 per cent, and no improvement in 10 per cent. The results of medical treatment could probably be indicated by reversing the order of these figures. Roentgen treatment, while of some benefit to a large proportion of purely exophthalmic cases is, according to those best informed on this subject, curative in only a very small number.

Surgical management of the toxic goiter patient is largely a matter of observing certain fundamental principles and applying them routinely to all cases, as it is impossible to predict the postoperative reaction by the degree of apparent toxicity. Every toxic patient is placed on the anoci-association technique, put at absolute physiological rest, given mild sedatives as indicated, and iodine as a specific in certain instances. The anoci-association technique, whereby the patient is kept in ignorance of the fact that he is to be operated on or of the time of operation, if he has been previously told that operation is necessary, is a valuable adjunct since mental and psychic disturbances are avoided. Such a procedure is necessary in only about 5 per cent of cases.

Administration of iodine as a pre-operative procedure in exophthalmic cases is always practiced, since its effect is so remarkable as to be considered practically specific. In the treatment of toxic adenomas the routine use of iodine is not subscribed to by the authors. It undoubtedly benefits a large proportion of these cases, but some unfavorable reactions have been seen which make dubious the routine use of this drug. Under no circumstances should iodine be given to a patient with an adenoma, except when the patient is in the hospital where he is being prepared for operation. Iodine, while one of our most valuable adjuncts in the surgical management of hyperthyroidism, has probably done more harm to patients with goiter than any other drug.

Since the operative procedure is one of election uninfluenced by immediate necessity, it follows that it should be performed when the point of maximum improvement after iodine therapy has been attained. The operation of choice is a bilateral subtotal thyroidectomy, and it is only by ultimately reaching this stage that cure can be expected. Various factors often demand a series of operations before complete removal is possible. It is largely through expe-

rience that judgment as to the correct procedure for the individual case is attained. Each patient should be evaluated soon after admission and the treatment planned accordingly.

The mortality statistics have been materially reduced since the advent of iodine therapy. Previous to 1920 the mortality in toxic cases averaged 2.77 per cent; since then there have been 262 consecutive operations on patients with toxic goiter with only 2 deaths, a mortality of less than 0.8 per cent (one of these deaths was unavoidable).

HARROLD, CHARLES C. Shall cancer be treated by radium or by surgery? *J. Med. Ass. Georgia*, October, 1926, xv, 394-395.

It seems out of the question to hope that one method of treatment will serve for all malignant growths. In cancer of the breast, surgery should be resorted to early and radically. The author sees not much result from the use of roentgen rays except in extensive skin involvements where it probably prolongs life somewhat. He does not believe that radium has any place at all in the treatment of cancer of the breast, not even in recurrent skin nodules unless as an adjunct to radical surgical removal.

In superficial keratosis and in skin cancers, radium seems to be the accepted treatment and seems to be definitely valuable. If the skin cancer extends to the cartilage as in the ear, surgery or electrocautery is preferable.

In the treatment of cancer of the lip there is great diversity of opinion. Radium should be used if superficial keratosis is present. If the lesion is more advanced it should be removed surgically. In late, bad cases radium may be used to prolong life. In cancer of the tongue it seems that at least 2 cases out of 3 are doomed. Radium is used in some clinics for tongue cancer, and in others electrocautery is used followed by dissection.

Treatment seems more definitely promising in cancer of the uterus. Almost everyone agrees that the treatment of choice in cancer of the cervix is radium and in cancer of the fundus, complete hysterectomy.

JACOBS, A. W. Carcinoma of the rectum and sigmoid. *Surg., Gynec. & Obst.*, July, 1926, xliii, 50-53.

An analysis is given of 125 cases of carcinoma of the rectum admitted to the Montefiore Hospital, New York City. Of the entire series 26 cases were treated by radium or deep roentgen therapy, either alone or in combination, with temporary improvement or palliation of symptoms in 9 cases. Brief abstracts of 4 such cases are given. The first case has remained free from symptoms two years and eight

months; the second case died four years after onset; the third died in three and a half years; the fourth has been under observation one year and the condition appears to be under control.

It is concluded that the majority of cases of carcinoma of the rectum are recognized when it is too late to accomplish much by radical surgery, and surgical statistics in the advanced cases are not encouraging. Here a proper combination of surgery and radiotherapy may accomplish something toward alleviation.

Radium when properly applied will inhibit and destroy a majority of rectal neoplasms. Radium is a valuable adjunct to surgical procedures and in selected cases pre- and post-operative irradiation should be practiced.

Deep roentgen therapy should also be given in the pelvis with the hope, first, of destroying or decreasing the amount of lymphatic tissue and thus decreasing the opportunity for metastasis; and second of destroying or inhibiting the growth of metastatic nodules.

KING, JAMES M. Cancer of the skin and mouth. *J. Tenn. M. Ass.*, September, 1926, xix, 115-120.

The author lays emphasis upon the value of the electrocautery in the removal of malignant tumors when the wound is to be left open and treated with roentgen rays. Under local anesthesia, it enables one to do practically a bloodless operation, and the tissue to be severed is in a clean bloodless field.

General descriptions are given of rodent cancer and prickle or squamous cell epithelioma, their clinical features, diagnosis and treatment.

The large flat epitheliomas the size of a quarter or a silver dollar, ulcerated or not, should be treated with roentgen rays or radium, roentgen rays preferably on account of the area. Large deep-seated nodular or larger ulcerated tumors should first be removed with electrocautery, and then the open wound treated with roentgen rays at intervals, allowing the wound to heal by granulation. The adjacent glands are not to be considered unless it is found that a squamous cell epithelioma has engrafted itself upon a basal cell type. The one necessary requirement for success in handling cancer is experience. Recurrence will appear, if treatment is not thorough.

BELFIELD, W. T., and ROLNICK, H. C. Roentgenography and therapy with iodized oils. *J. Am. M. Ass.*, 1926, lxxxvi, 1831-1833.

The authors have studied the therapeutic effects of various iodized oils after injection into the seminal ducts through vasotomy, usually bilateral, in 67 men, with immediate

roentgenograms in all. The viscosity of lipiodol and iodipin renders the filling of the vesicles difficult and at times incomplete. The failure of absorption of lipiodol is shown by its persistence in the vesicles and in the connective tissue at the internal inguinal ring (Bogros' space), into which it was intentionally injected by way of the sheath of the scrotal vas.

Since animal oils are more readily absorbed, the authors have tried to dissolve iodine and its compounds in each of several animal oils. The prime object was therapeutic efficacy with harmlessness. Two solutions have been found satisfactory. The first consists of iodol, 10 gm., in cod liver oil 40 c.c. giving a mixture containing more than 18 per cent of iodine. The second solution consists of 10 gm. thymol iodide in 30 c.c. of cod liver oil, giving a solution containing 12 per cent iodine. Either liquid clears the vesicles of gonococci and of pyogenic bacteria commonly found there. They are sufficiently fluid to fill the vesicles without undue pressure; and they are absorbable and do not stimulate cicatrix formation.

The iodol-oil mixture gives roentgenographic shadow of the vesicles, less dense than that furnished by the customary collargol 10 per cent solution, or by lipiodol. It is possible that these iodized oils may be found useful in other fields of roentgenography as harmless and inexpensive substitutes for lipiodol and iodipin.

Attention is called to the clinical importance of Bogros' space especially to industrial surgeons. The sheath of the intrapelvic vas is usually not continuous with the sheath of the scrotal vas. Each segment ends in the intervening loose connective tissue at the internal inguinal ring; hence infections traversing the sheath of the vas from the vesicles diffuse into this space causing tender swellings, even suppuration, at the internal ring which simulate hernia. A good many "industrial hernias" are nothing else than infections that have traversed the vas to Bogros' space from the vesicles. An illustration is presented showing the persistence of lipiodol in Bogros' space and vesicles thirty-seven days after injection. The oil which was injected toward the body within the sheath of the scrotal vas, had diffused through Bogros' space but did not enter the sheath of the pelvic vas.

CASE, JAMES T., and UPSON, W. O. Roentgenologic aspects of various types of hernia. *J. Am. M. Ass.*, 1926, lxxxvii, 891-898.

Cases of hernia have been encountered in the roentgen examinations which have been very interesting, and at times life saving. Some of these experiences have occurred with ordinary inguinal and postoperative ventral hernia and

others with umbilical hernia; but the most striking have been found with diaphragmatic and intra-abdominal herniations. The authors have had no case of femoral hernia in which the roentgenograms have been helpful.

A review of the results of operation or necropsy in several hundred cases of hernia involving the abdominal contents reveals interesting possibilities in the way of roentgenographic diagnosis. The possibility of encountering hernia should be kept in mind during routine barium meal studies. Special technique is required by special types of hernia, such as diaphragmatic, retroperitoneal and postoperative hernia in which the roentgen study offers the greatest likelihood of affording useful information.

*Paraduodenal Hernia.* It is possible to diagnose correctly retroperitoneal hernia involving the bowel. The roentgenograms in two of the authors' cases are presented. The disposition of the small bowel was typical showing the spherical well bounded zone in which the small intestine was confined. The confined intestinal coils could not be disturbed by any amount of manipulation or change of position of the patient. The part of the small bowel thus compressed into an ovoid mass remains supported high in the abdomen when the patient assumes the erect position, whereas the normal bowel gravitates toward the true pelvis with the patient erect. There is often a marked distortion or displacement of the colon and sometimes also of the stomach. In some cases the entire colon lies in the left side of the abdomen so that the small bowel appears in the right upper quadrant suggesting a congenital failure of the colon to rotate. One of the obstacles to correct interpretation lies in the differentiation between retroperitoneal hernia and incomplete rotation of the colon. In every case which seems to present evidence of incomplete rotation, that is, in which the duodenum comes from the pylorus directly toward the right, with distribution of the upper jejunum on the right instead of on the left of the midline, one suspects a possible paraduodenal hernia.

*Paracecal and Intersigmoid Hernia.* A hernia into the paracecal fossa is a great rarity and in the case observed by the authors the cecum occupied the normal position. Stereograms showed that several coils of the small intestine occupied a position behind and to the right of the ascending colon and cecum. These herniated coils were so densely adherent that it was necessary to resect 20 inches of terminal ileum, cecum and ascending colon with end to side anastomosis to give relief. The patient remains in excellent health fourteen years after the operation. The authors have not recognized

a case of hernia into the intersigmoid fossa. To recognize the presence of small intestine behind or between the layers of the sigmoid mesocolon, stereoscopic and roentgenoscopic manipulative studies should be made with a combined barium meal and opaque enema so that the small intestine and the sigmoid may be filled simultaneously.

*Hernia into the Lesser Peritoneal Cavity.* This presents a more fertile field for roentgen investigation. The proper reading of the roentgenograms in several cases was possible after repeated examination and the use of manipulation with the protected hand under the roentgenoscopic screen. The stereoscopic films must be made with very brief exposure and with very little interim between two exposures. Good results are obtainable only with apparatus that permits a completion of the two films within one and a half or two seconds, the breath being held in the meanwhile. Hernia through the foramen of Winslow occurs as frequently as right duodenal hernia. To establish the existence of such a hernia, the small bowel should be identified anterior to the hepatic flexure or the first part of the transverse colon. The small bowel may also pass into the lesser peritoneal sac through a breach in the transverse mesocolon; and the hernia, as is curiously the case in the majority of instances reported, may be associated with a coexisting gastric or duodenal ulcer, though no satisfactory explanation has been offered for the coexistence of the two lesions.

*Diaphragmatic Hernia.* These usually occur through the posterior part of the diaphragm on the left side. Right sided hernias occur only about once to ten times on the left side. The practical difficulty in differential diagnosis is the similarity of the roentgenogram in relaxation or eventration of the diaphragm and in true diaphragmatic hernia, especially in the traumatic cases. The contents of the hernia may include stomach, small intestine, colon, omentum, liver, spleen, pancreas and kidney. Even with the aid of the screen or roentgenogram the lesion is sometimes found only after several examinations. Spontaneous reduction of the hernia may occur just prior to the roentgen-ray study, thus contributing to diagnostic failure. The diagnosis of diaphragmatic hernia depends on proof of the absence of the intact normal, rounded dome of the diaphragm with characteristic thoracic shadows above the rounded dome. The hernia having been discovered it should be possible, especially with the patient in the erect position, to detect the air globus in the highest part of the gastric fundus within the thorax and to see through it the superimposed shadow of pulmonary mark-

ings characteristic of the base of the lung. In a differential diagnosis one must consider and rule out the following: eventration; diverticulum of the esophagus; hour glass stomach; sacculated air or fluid air in the chest; thoracic stomach; diverticulum of the stomach, and gastric ulcer causing cicatricial contraction with concomitant relaxation of the left diaphragm.

**Umbilical, Inguinal and Femoral Hernia.** In the majority of umbilical and inguinal hernias the roentgenograms are not of great interest although they may yield some interesting discoveries of secondary importance and symptoms of great rarity. This is illustrated for instance when there is shown in the hernia a portion of the stomach or the appendix, especially when the latter is shown to be situated in a left inguinal hernia, or when one plans to remove the appendix in connection with an operation for right inguinal hernia. One of the surprising conditions observed by the authors was an extensive herniation of the sigmoid in an inguinal sac with multiple diverticula in the herniated sigmoid.

**Postoperative Hernia.** The roentgenographic examination with the opaque meal or possibly with pneumoperitoneum is a fairly constant indication in postoperative hernia which is suspected of causing trouble, especially where there is a history of recurring attacks of abdominal distress. There may be no actual emergence of abdominal contents, the hernia consisting of only a slight separation of the muscle at the site of the wound. When intermittent obstruction is suspected roentgen studies should be made hourly, beginning immediately after the barium meal, as long as opaque material remains in the small intestine.

CHRISTIE, A. C. Osteochondritis, or epiphysitis. *J. Am. M. Ass.*, 1926, lxxxvii, 291-295.

Brief descriptions are given of the following: (1) osteochondritis deformans juvenilis coxae; (2) Osgood-Schlatter's disease; (3) Köhler's disease of the tarsal scaphoid; (4) Köhler's disease of the second metatarsus; (5) vertebral epiphysitis; (6) miscellaneous conditions classifiable as epiphysitis: (a) epiphysitis of the os calcis; (b) osteochondritis dissecans of König.

A typical case of vertebral epiphysitis in a girl aged fifteen is briefly described. The roentgen examination showed the presence of slight scoliosis and marked kyphosis in the lower dorsal and upper lumbar region. The bodies of the three lower dorsal and two upper lumbar vertebrae were somewhat beveled and irregular on their superior and inferior aspects. The epiphyses where they could be seen were fragmented and indistinct and the joint spaces were hazy.

HESS, GEORGE H. Sub-pleural fibrolipoma: Report of a case. *Radiology*, June, 1926, vi, 525-527.

The case occurred in a woman aged forty-nine, complaining of shortness of breath upon slight exertion. The roentgen examination disclosed a dense, sharply outlined, spherical mass measuring about 12.5 cm. in diameter located at the base of the left posterior chest between the 5th rib and the 11th interspace. There was no evidence of invasion, and the mass appeared to have its origin on the left side of the vertebral border of the chest cavity. Roentgenographically the mass appeared to be fixed, did not move with respiration, did not pulsate and did not displace the heart shadow. The lung appeared to glide about it during respiration. The patient was re-examined six months later and there was no perceptible change in the size or shape of the mass. The conclusion was that this mass was a cyst on the left chest attached to the left side of the spinal column.

At operation the mass was removed and found to be a subpleural fibrolipoma. Six months following operation the roentgenograms of the chest showed resection of the sixth, seventh, eighth and ninth ribs at the posterior angle on the left side with no evidence of the previously existing tumor, the lungs and mediastinum being normal.

LAWSON, JOHN D. Report of a case of gastric diverticulum. *Radiology*, June, 1926, vi, 518-520.

The gastric diverticulum was found in a woman aged fifty, who was admitted complaining of gas, sour stomach and colicky pains in the upper right quadrant of the abdomen of at least one year's duration. The roentgen examination showed the esophagus to transmit food normally without signs of cardiospasm. The stomach filled normally, was of the J-type, normal mobility and motility, and of good tone. There was a definite extravasation of the barium mixture beyond the gastric border on the posterior surface at about the level of the esophageal opening. The size of the pouch was approximately  $2 \times 3$  cm. There was regurgitation of the meal into the esophagus. The duodenal bulb filled normally showing no deformity, irregularity or angulation. The six-hour examination showed the stomach empty but the pouch still filled. Several gall-bladder films showed a rounded contour in the gall-bladder area. The roentgen conclusions were: (1) chronic cholecystitis; (2) the out-pouching from the stomach might be a perforating gastric ulcer or a diverticulum of the stomach. The even contour of the pouch



would make the latter diagnosis more probable. At operation there was found cholecystitis, subacute, with stones; subacute appendicitis. The stomach showed no masses or inflammatory processes from the esophageal opening down to the duodenum.

Although the gastric diverticulum was not observed at operation, the surgeons agree that a lesion of this size could easily be overlooked. In this case a very careful search was made but an out-pouching 2 cm. in diameter would be very difficult to palpate unless there were present at the same time adhesions or other evidence of inflammation.

McCoy, C. C., and GRAHAM, R. S. Experience with cholecystography in cases coming to operation. *J. Am. M. Ass.*, June 19, 1926, lxxxvi, 1899-1902.

In 26 consecutive cases in which operation was done at the Lakeside Hospital, Cleveland, the cholecystographic diagnoses were confirmed at operation in 96 per cent. In 212 cases collected from the literature, with intravenous administration of the dye, the cholecystographic diagnoses were confirmed in 91 per cent. In cases with the oral administration of the dye the confirmation was more than 80 per cent. The accuracy of cholecystography in detecting gall-bladder disease merits its wide use as a procedure in diagnosis.

OBER, FRANK R. Diagnosis in orthopedic surgery. *J. Am. M. Ass.*, June 12, 1926, lxxxvi, 1813-1815.

The orthopedic surgeon of today is well trained in the application of therapeutic measures to prevent and relieve deformity, but he is often faced with problems which have not been properly analyzed or which have been solved only after considerable injury has been done to important structures. Some of the reasons for this are wrong diagnosis, late diagnosis, snap diagnosis or the diagnosis of hysteria. Most weaknesses in solving problems in diagnosis are due to (1) bad elementary training; (2) insufficient knowledge of the fundamental subjects in medicine; (3) lack of proper hospital training; (4) incomplete physical examination; (5) failure to make a thorough search for the cause of the ailment; (6) premature selection of a specialty, and (7) dependence on the roentgen ray alone.

Dependence upon the roentgenographic evidence for making a diagnosis is a fault in a good many clinics and has been the cause of a good deal of harm. In the first place, pathologic changes may be present for many days or even weeks before the roentgen ray will reveal them. In the second place there are so many

lesions that give similar appearances in the roentgenogram that a precise diagnostic interpretation cannot be made. The roentgenogram is a valuable aid in diagnosis; so is the clinical thermometer; but no one would think of depending on the latter alone for a diagnosis.

There are four diseases which are often diagnosed late and which are responsible for more cripples than all the other orthopedic conditions combined. They are acute osteomyelitis, acute poliomyelitis, bone and joint tuberculosis, and chronic arthritis. In acute osteomyelitis the roentgen-ray findings are of no value for early diagnosis. Poliomyelitis should if possible be diagnosed in the paralytic stage, which can be done in most cases. The early signs are mental irritability, stiffness of the neck and headache. In arthritis the prodromal signs and symptoms are too often ignored or treated with a few doses of acetylsalicylic acid, when active measures will check them or even result in a cure. The examination of such patients should not stop with infected teeth and tonsils, and a great deal of attention should be paid to the gastrointestinal tract. Barium meals may be necessary, and an examination of the stools should always be made.

When joint tuberculosis is suspected a thorough history should be taken and an examination made to determine whether or not there is a primary focus. Such an examination should include a roentgen examination of the chest, a tuberculin intradermal test and also a focal tuberculin test. Roentgenograms of the joints should be taken, and when the evidence is not sufficient a biopsy done.

RICHTER, H. M. Cholecystography. *J. Am. M. Ass.*, March 27, 1926, lxxxvi, 937-938.

The inherent dangers of cholecystography must be quite fully appreciated. One of them is that it fosters a tendency to think in terms of late pathologic changes; another is that the normal roentgenogram is likely to direct attention away from the actual source of trouble. That cholecystography is intrinsically of great value has been amply proven, especially in patients with advanced gall-bladder disease in whom the clinical history is atypical or difficult to obtain.

During the terminal stage of the evolution of gallstones the new roentgenographic evidence is of great interest, undoubtedly accurate when positive, and often of great value. During the years before the terminal stage is attained the method becomes decreasingly accurate, for with less advanced changes in the gall-bladder wall and cystic duct lumen, the dye may reach the gall-bladder readily, and the concentrating function and contractility may

be but partially impaired. However, when the clinician visualizes gall-bladder discascins terms of early pathologic changes, chronologically at the period of early symptoms of extragastric dyspepsia, when the alert physician really wishes to make a diagnosis, and often can do so on the history alone, we find that not only must cholecystography fail, but the beautifully clear cut roentgenogram of the typical normal gall-bladder actually directs the attention away from it as the source of trouble.

SCHÖNFELD, HERBERT. The roentgenological differential diagnosis between hernia and diaphragmatic relaxation. *Klin. Wchnschr.*, Sept. 3, 1926, v, 1657-1660.

Observations show that in the case of a very large defect of the diaphragm the hernial sac can appear in the roentgenogram as a uniform domed curve extending from the mediastinum to the lateral thoracic wall and from the vertebral column to the sternum, without adhering to the contours of the projected abdominal organs so that the defect may imitate completely the characteristic picture of the *diaphragmatic arch*. On the other hand, it is entirely possible theoretically that in a case of relaxation a paper-thin, entirely relaxed diaphragmatic sac may mantle the subjacent abdominal organs in a manner analogous to the hernial sac. In fact such a case was found at autopsy by Glaser in 1903. In such a case the roentgenogram would disclose the contours of the diaphragm and thus lead to an erroneous diagnosis of hernia.

From the above considerations it is clear that the presence of a uniform arch or the appearance of a broken outline is only of conditional value as a differential diagnostic character distinguishing between hernia and relaxed diaphragm. This merely emphasizes the fact that it is difficult to base generalizations on single characters and that interpretation should take into consideration all the facts possible.

A report is given of a case of congenital, true diaphragmatic hernia in which the usual reliable roentgenological characteristics were absent. During the roentgen examination the diaphragm always showed a uniform arched appearance both in the upright and recumbent positions. The tentative clinical diagnosis was relaxed diaphragm. The infant died of bronchopneumonia and the autopsy disclosed a true diaphragmatic hernia with crowding of the thoracic organs upward and to the right.

SHELDEN, WALTER D. Secondary tumors of the brain. *J. Am. M. Ass.*, Aug. 28, 1926, lxxxvii, 650-654.

Approximately 5 per cent of the brain tumors

examined at the Mayo Clinic are metastases from malignant disease elsewhere in the body. These metastatic tumors present no essential characteristics which distinguish them from primary tumors of the brain.

A roentgen examination of the lungs and head is very important when evidence of secondary tumors is sought; and such reports as healed tuberculosis, miliary tuberculosis, pleural adhesions, pneumoconiosis and pleural effusions should be received with reserve and examinations should be made at sufficient intervals to determine whether these signs remain constant. Primary carcinoma of the lung is particularly prone to metastasize to brain, meninges, and bones of the spine.

A roentgenogram of the head seldom gives evidence of secondary tumors in the brain although the skull is quite often invaded by metastatic tumors, notably by hypernephroma. Suspicious signs in the bones of the chest or skull, themselves not diagnostic should lead to further study of the osseous system for more positive data. Carcinoma of the nasopharynx often invades the skull, and its first clinical symptoms may be ocular palsy, chiasmal signs or involvement of the fifth and other cranial nerves.

For instance, in hypernephroma when the tumor is small or located peripherally it may exhibit no signs or symptoms and the various examinations may be negative. A primary tumor with metastasis in the brain may be entirely missed. Roentgenograms of the chest and skull should be taken as soon as symptoms suggesting brain tumor appear both for their immediate value and for comparison with later studies.

Two illustrative cases are cited in detail. In addition there are tabulated three groups of metastatic tumors of the brain. Group I, consisting of 10 cases, includes latent malignant disease, the initial symptoms of which were due to cerebral metastases. The importance of the roentgen examination of the chest in these cases is emphasized. Group II includes 6 cases of malignant disease which were symptomless, but demonstrable on examination. The initial symptoms in these were cerebral. In this group are included three cases of carcinoma of the nasopharynx and 2 cases of carcinoma of the thyroid. Group III includes 8 cases in which the malignant tumors were removed surgically, and the cerebral symptoms were the first evidence of recurrence. Three of the cases developed following removal of breast carcinoma and one each from carcinoma of the sigmoid, hypernephroma, sarcoma of the testis, malignant mole and tumor of the parotid gland. There is still another group of



malignant disease which during its clinical course metastasizes to the nervous system with or without the production of definite symptoms.

SIMPSON, FRANK E., and FLESHER, ROY E. Radon (radium emanation) as a palliative agent in the treatment of intra-oral cancer. *J. Am. M. Ass.*, Aug. 28, 1926, lxxxvii, 655-657.

The usual technique employed by the authors is as follows: If only surface irradiation is to be given, approximately 1000 mc. screened with 2 mm. silver and 2 mm. rubber is applied to an area 4 to 6 sq. cm. for fifteen minutes. Great care must be taken not to rub or traumatize the lesion. Sometimes a lesion is of such irregular contour that several applications are necessary, and in these cases due regard must be paid to overlapping. If intratumoral treatment is also indicated a preliminary surface irradiation is given with 1000 mc. in order to minimize the danger of metastasis. This procedure is regarded as very important. Then bare glass tubes are implanted under local anesthesia, each tube containing 0.5 to 1.0 mc. of radon, the tubes being distributed 1 cm. apart, evenly throughout the lesion. These are allowed to remain since the tubes either become encysted or slough out during healing. A small piece of tissue for microscopic examination is removed with a small sharp punch immediately after the first powerful irradiation.

To guard against local effects on the fingers the radon tubes are handled with rubber covered forceps 12 inches long. The operator during the application of the radon is shielded from the patient by movable lead angle plates each weighing about 300 pounds. The lymphatic glands of the neck of the patient frequently require irradiation, and the radon is applied by means of wooden carriers  $4 \times 4 \times 4$  cm. For the protection of the patient a heavy movable lead shield is employed which fits around the wooden block carrying the radon and is suspended above the table on which the patient lies.

Between 1919 and 1922 the above radon treatment was employed in 56 unselected cases of intraoral squamous cell cancer, none of the cases being favorable for operation. The clinical diagnosis was confirmed microscopically in all of these. There were 52 men and 4 women. The average duration of the disease was 5.3 months. The lesion was on the tongue in 9 cases, on the floor of the mouth in 3, and buccal mucous membrane in 17, the superior maxilla in 8, the inferior maxilla in 7 and the palate and tonsil in 12. In 29 cases there were palpable lymph nodes in the neck; in 23 the submaxillary nodes were apparently affected

and in 4 the cervical nodes. One case had palpable submaxillary and submental nodes; in another there were palpable submental and cervical nodes. In 27 cases no definite nodes could be detected.

Thirty-nine of the 56 cases have been carefully traced. Of these 21 had definitely palpable lymph nodes when treated. Of these 2 are living, one having been well for over five years and the other for over four years. The remainder died but the majority showed definite improvement for a time. The duration of life after treatment varied from four months to three years, average 16.4 months.

Of the 18 patients without nodes 14 are living, 4 for more than five years, 5 for more than four years, and 5 for more than three years. Four of the patients are dead. Three of the latter lived for more than three years after treatment but all died eventually of recurrence.

Of the 9 patients with tongue cancer 6 had palpable nodes in the neck, and 2 of these are living. Of the 3 patients without nodes, 2 are living. The 4 living patients with tongue cancer have been well for five years, four years, three and a half years and three years respectively.

Assuming that the 17 untraced patients are dead, the total mortality in this group of 56 unselected patients is 63.3 per cent. The remainder have been well for periods of three to five years, the average duration of freedom from symptoms of cancer being three years and nine months up to the time of this report.

SUTHERLAND, CHARLES G. Polypoid tumors in the pyloric end of the stomach: Reports of three cases. *Radiology*, June, 1926, vi, 520-522.

The first case occurred in a woman aged sixty complaining of "stomach trouble" of one year's duration. Examination revealed a movable, tender mass in the right flank supposed to be a kidney. A roentgenogram revealed a large shadow in the area of the right kidney at the level of the fourth lumbar vertebra, and cystoscopic examination showed the function of the right kidney to be greatly impaired. Roentgenoscopy elicited a narrowing of the antrum of the stomach, pre-pyloric spasm so frequently associated with gastric ulcer, and the films presented a saucer shaped defect in the duodenal cap. At operation a soft movable tumor about 6 cm. in diameter was found at the pyloric end of the stomach. This tumor could be invaginated into the duodenum. The patient also had a gastric ulcer on the lesser curvature, about 7.5 cm. above the pylorus. The right kidney was resected at a later operation when a pyonephrosis with stone was found.

The second case occurred in a man aged fifty-one complaining of anemia and weakness in the legs. The patient had five years previously received treatment for *Entamoeba histolytica* infection. Roentgenoscopic examination of the stomach elicited an obstructive lesion in the pyloric end. This defect in the pylorus had a smooth margin, no shelf was elicited and there was no palpable mass. The operation disclosed a polyposis associated with multiple ulcerations in the pylorus just above the pyloric ring. The involved area was resected and convalescence was uneventful.

The third case occurred in a man aged sixty-one who complained of anemia which had lasted three years. Roentgenoscopy revealed an interesting filling defect in the duodenum. The barium was occluded by a tumor and presented a picture of fine trabeculations running in various directions across the cap. A diagnosis of benign tumor was made. At operation a movable, adenomyomatous polyp was found arising from the stomach just at the pylorus and invaginated into the duodenum. The tumor occluded the greater portion of the barium but left the contour of the duodenum intact. It is remarkable that this patient had no history of obstruction or impaction.

WOLFSOHN, JULIAN M., and MORRISSEY, EDMUND J. Tumors of the cauda equina. *J. Am. M. Ass.*, 1926, lxxxvi, 1828-1831.

Tumors of the cauda equina are more common than supposed. In the early cases roentgen examinations of the lumbosacral region and lumbar puncture are usually negative. The most valuable auxiliary for accurately localizing spinal block lies in the introduction of from 2 to 3 c.c. of lipiodol into the cisterna magna by Sicard's method. With the patient in a sitting posture the oil rapidly passes into the spinal subarachnoid space and is checked at the level of the block which can then be clearly visualized by roentgen examination with patient erect.

Two cases are reported of cauda equina tumors illustrating delayed and inaccurate diagnosis. The first patient was treated for Pott's disease, and suffered for thirteen years before a correct diagnosis was made. His subjective symptoms most of this time pointed to a caudal disease, and subsequent diagnoses were most probably colored by the previous erroneous diagnosis. The second patient presented a suggestive caudal lesion: burning pains in the perineum, radiating pains, increased by recumbent posture and relieved by walking, and

severe constipation which were absent before the present illness. This is a suggestive and important triad of caudal symptoms which this patient presented for about two and a half years. Both patients presented few neurological findings. The diagnosis of caudal lesion was made pre-operatively in each case and confirmed by the intrathecal injection of lipiodol which accurately localized the upper level of the lesion. Both these cases conformed in a general way to Type II (middle type syndrome of Roussy and Lhermitte). In the second case, xanthochromic spinal fluid was found below the tumor at operation and above the tumor as high as the cisterna magna. This confirms the observation of Cushing and Ayer.

MAYER, ERNST G. Results of the treatment of carcinoma with a combination of roentgen rays and intravenous dextrose injections. *Klin. Wchnschr.*, Aug. 13, 1926, v, 1519-1520.

From certain theoretical and clinical considerations the author tried intravenous dextrose injections together with roentgen therapy in certain hopeless cases of carcinoma at the Holzknecht Institute. The first results were so striking that a more extended trial appeared justified. The patients received the customary roentgen treatment, i.e., a full dose over one field every day and in addition preceding each irradiation, there was given an intravenous injection of 10 c.c. of a 10 to 50 per cent glucose solution. Fifty cases have been treated in this manner, including cancers of different portions of the body. In 11 cases the cancer continued to develop apparently unaffected; in 9 cases the condition remained the same; in 6 there was partial improvement; in 17 there was improvement of the whole clinical picture, and in 7 there was improvement of the whole clinical picture succeeded by a turn for the worse. Only four months have elapsed since this treatment has been instituted and therefore conclusions cannot be drawn, but the fact that such highly refractory conditions as carcinoma of the tonsils have shown a favorable response is worthy of note.

The impression is obtained that the effect of the injections is an acceleration and intensification of the roentgen effect.

It is to be remembered that intravenous injections of hypertonic glucose solutions are able to awaken latent infections. Consequently the author finds it advisable to interrupt the radiation treatment in those cases showing a febrile reaction to the glucose injections until the time when temperature returns to normal.



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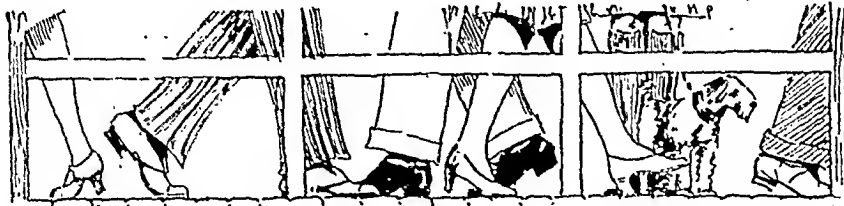
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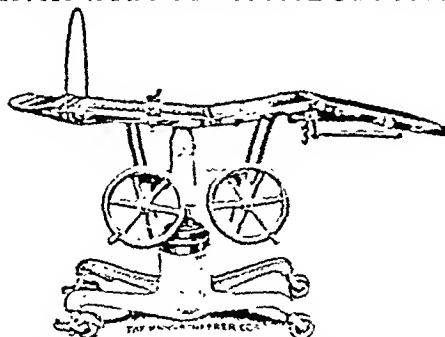
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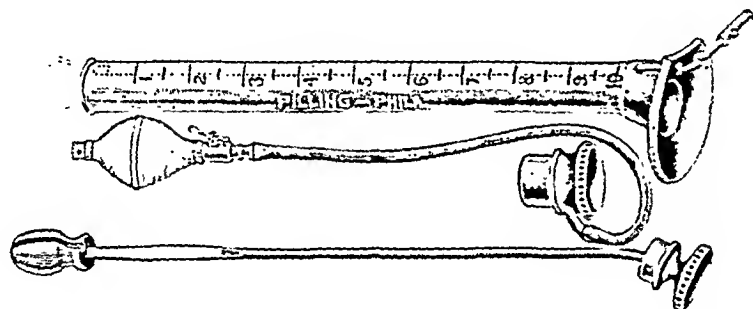
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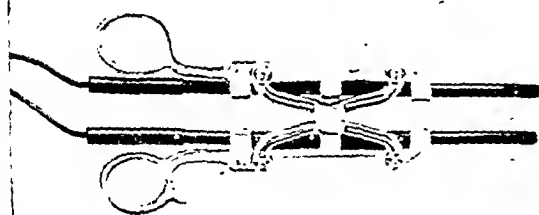
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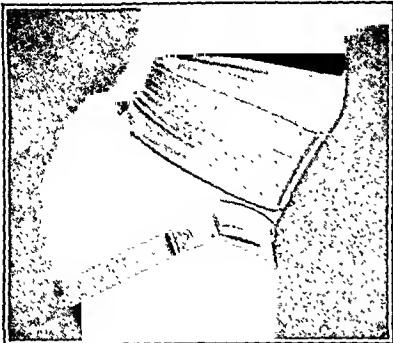
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